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Flouting Authority

THIS week, the General Council of the Trades Union Council has issued a preliminary report on its inquiry into industrial disputes. It was based on replies received to questionnaires sent to 147 unions representing 7,510,000 members. Of these, 85 with 1,268,000 members said they had not been involved in any stoppage during the past four years. A further 32 unions (mostly small) with 280,000 members either did not reply or said they had insufficient records to complete the questionnaires. Six unions with 380,000 members objected to the inquiry, three claiming that the General Council had no authority to undertake it. Some unions gave information about a representative cross-section of disputes. The General Council dealt out its criticism fairly: "bad employers" made hasty decisions, were preoccupied with "face" and "prerogatives," and did not conduct inquiries into their own malpractices or criticise their delinquents: the Press had an "obsessional interest with irregularities." On the other hand, some shop stewards attempted to form a national centre or to call national conferences of stewards irrespective of the industry in which they worked. The aim of the sponsors of this action was to usurp the policy-making functions of unions or federations of unions. Unions were advised to inform their members that participation in such bodies was contrary to the obligations of union membership. Whatever the motive of those responsible, the effect of its action was often a challenge of established union arrangements. For some time, it had been a policy of disruptive bodies to try to form national organisations of stewards. This did not mean that political considerations were uppermost when all such organisations were formed. None the less, cases of muddle, duplication, and even conflict had arisen through these bodies acting as though they were independent of union obligations. Attempts to bring about changes in union structure without consultation with the elected authorities of these unions postponed progress. In making these and similar observations, the General Council of the T.U.C. has shown that it is suffering from one of the greatest ills to beset all levels of management today—an insufficient understanding on the part of the rank-and-file worker of the nature of true democracy, and a popular identification of this with a state in which each individual concerned can wreak his will in complete disregard of any central authority—in other words, create a state of anarchy.

The Employers' View

COMMENTING on T.U.C. criticisms of management, Sir George Pollock, Director of the British Employers' Confederation, said that there never was a time when employers gave closer attention to industrial relations than at present. Mistakes were made by both sides of industry, and it would be silly to suggest that one side was blameless. It should be remembered that an employer involved in a dispute was on his own, whereas the workers concerned acted collectively. The unions had to ensure that when they so acted, they acted wisely and responsibly. He commended a T.U.C. suggestion that disciplinary action be taken against strikers who acted contrary to union policy: if this question were not tackled, it would seriously damage the trade union movement. Referring to the T.U.C. belief that 32 per cent of strikes reported to it concerned money, Sir George Pollock pointed out that a large proportion occurred in highly-paid sections of industry where, for instance, a new development was to be launched. This observation, which is borne out by the circumstances surrounding several recent strikes, reflects an attitude which is becoming widespread among the general public, which cannot be blamed for wondering whether some strikes are not launched purely for their nuisance value.

Russian Loan for Iraqi Railways

THE loan from the U.S.S.R. to Iraq, agreed last week, of 180 million roubles (about £16 million at the official rate) for railway development is stated to be associated with purchase from Russia of motive power, rolling stock, and other material. The immediate purpose, it is reported, is construction of a standard-gauge line from Baghdad to Basra. What may perhaps be envisaged is conversion of the existing metre-gauge track. Whether new or converted, a standard-gauge line would permit through running from the Bosphorus to the Persian Gulf—an ambition, 60 years ago, of Imperial Germany. Soon Russian-built vehicles will run to the Gulf. Motive power in Iraq now consists of oil-fired steam locomotives; what the U.S.S.R. is to provide—presumably diesels—has not been announced. Within four years the new line is to be surveyed under Russian supervision, and rails and other material are to be delivered from the U.S.S.R., which will co-operate in building wagon assembly plants and locomotive repair shops and in the production of concrete sleepers.

Overseas Railway Traffics

OPERATING revenues of the Canadian National Railways for the month of June, 1960, amounted to $59,291,000. Expenses, taxes, and rents totalled $60,029,000, resulting in a net operating income deficiency for the month of $738,000. In June, 1959, operating revenues were $65,893,000; expenses, taxes, and rents were $63,028,000 and the net operating income was $2,865,000. The aggregate net operating income defici-

ency for the six months to June 30, 1960, amounted to $8,269,000. Costa Rica Railway receipts for June, 1960, amounted to colones 2,765,188 compared with colones 2,237,291 in June, 1959. Aggregate receipts for the year ended June 30, 1960, amounted to colones 27,410,052, compared with colones 24,928,915 in 1959, an increase of colones 2,481,137. The approximate gross earnings of the Indian Railways for June, 1960, showed an increase of 6·44 per cent compared with the approximates for June, 1959. During the month the number of wagons loaded with goods traffic increased by 4·12 per cent on the broad gauge and by 5·81 per cent on the metre gauge compared with June, 1959. Salvador Railway Company receipts for June amounted to colones 148,000 compared with colones 127,000 in June, 1959.

Indian Railways Labour Relations

THE freedom of the railways in the Republic of India from labour troubles is shown by the low incidence of working days lost through disputes and the success with which services and workshop output was maintained during the strike of Government employees last month. Railway employees total some 1,000,000, and the number of man-days of work done in a year is more than 4,000,000. Man-days lost through stoppages on the railways were the lowest during the year ending March, 1960, since Partition in 1947. Losses dropped from 23,000 man-days in 1956–57 to 5,000 in 1959–60. In Indian industry as a whole, 5,600,000 man-days were lost during the calendar year 1959, and 7,800,000 in the previous year. On any one of the eight Government railways staff and labour questions are dealt with at three levels: at district, division, or line headquarters. Matters for consideration on an all-India basis are discussed between the Railway Board and the railwaymen's federations concerned. This machinery has been functioning successfully since 1952.

Less Steam Haulage in Germany

THE proportion of engine-miles on the German Federal Railway (Western Germany) worked by steam dropped early this year to below 60 per cent, for the first time. In the past 10 years it has fallen from 82·2 to 59·4 per cent for steam and risen from 8·8 to 20·6 for electric and from 3 to 20 per cent for diesel motive power. Some 12 per cent of German Federal Railway track-miles are electrified, but in 1959 over 23 per cent of goods ton-miles was electrically hauled. In view of the progress of electrification and of introduction of diesel haulage, the last steam locomotive is expected to be withdrawn by about 1980. Because of the large fleet of steam locomotives to be replaced, of the ready availability of coal, and of the cautious policy pursued as to electrification, the German Federal Republic will be one of the last countries in Western Europe to see the end of steam haulage.

Glasgow Electric Stock

A FEATURE which was considered to be of primary importance in the design of British Railways, Scottish Region, Glasgow suburban electric stock was the attraction of off-peak tourist traffic. To determine the most attractive specification to meet this requirement, the Pressed Steel Co. Ltd. produced a full-size mock-up of the complete train in which all possible alternatives of seating layouts, cab styling variants, colours and materials for interior décor and upholstery, and choice of fittings were displayed. Loading and unloading of the peak-period traffic is greatly facilitated by the air-operated sliding doors, electrically controlled by the guard. Because of the large proportion of line electrified at 6·25 kV. full use will be made of the automatic change-over from the standard 25 kV. supply. In common with the traction motors fitted in the Manchester–Crewe multiple-unit stock, special provision is made to provide ripple-free current after conversion for the d.c. motors to improve commutation. Delivery of the complete order of 91 three-car sets is now well advanced.

Swiss Automobile Trains

AFTER the introduction of the auto-transport trains over the Gotthard line, the Swiss Federal Railways introduced a similar service through the Simplon tunnel, between Brigue and Domodossola and in the six winter months of 1958-59 a total of 12,098 motorcars was transported; but beginning on December 1, 1959, new trains and a new service were inaugurated running from Brigue only as far as Iselle, and up to May 31, 1960, a total of 18,419 motor vehicles was carried. Meanwhile, the Loetschberg line (B.L.S.) has also begun a similar service between Kandersteg and Brigue, but in the summer, and the through automobile train from Ostend to Milan follows this route, and has been carrying an average of 42 automobiles a day compared with 33 last year. On all services the automobiles are carried on flat trucks with low light-alloy hinged sides, such as described on page 246; and in some cases the Loetschberg railway is using its new two-power electric-diesel locomotives for haulage of automobile trains.

More on Automobile Transport

THE transport of automobiles is proving a lucrative and growing traffic on British and certain Western European railways, not merely in the purely freight traffic of new automobiles delivered from the makers' works in adapted two-deck (in America now three-deck) goods wagons, but in the special automobile services for cars and passengers as exemplified by the Anglo-Scottish services of British Railways, the Ostend-Milan through service, and the Swiss services over the St. Gotthard and Simplon routes. At the moment the accommodation in such trains is limited, and must to some extent always be so. But this kind of traffic is capable of extension in certain other directions. For example, for six days a week it is now possible to take one's automobile to Duisberg, Essen, Hagen and Cologne stations on the German Federal Railway, have it transported to Munich by freight train, and being guaranteed a pick-up of the car at Munich within 24 hr. (from Cologne) or within 36 hr. (from the other stations named). The car owner and his passengers have full choice of all the passenger trains from the Rhine/Ruhr area to Munich.

Main-Line Diesel Locomotives for East Africa

A FURTHER stage in the transition from steam to diesel haulage on East African Railways has been reached by the shipment of a batch of 1Co-Co1 English Electric 1,840-h.p. locomotives. Although designed for operation in a specific area the salient features amply cover the requirements of a general-purpose specification. High power with minimum weight is obtained by use of a turbo-charged engine with charge cooling. A means of adjusting the full power output setting of the engine allows the greatest use to be made of the maximum permissible output under the wide variations between sea-level tropical conditions and operation at 9,000 ft. altitude. One feature of major importance considered in the bogie design was the elimination of weight transfer to enable a high tractive effort to be used safely for starting and to give the required high performance for improved traffic speeds on gradients. Another is the reduction of wheel-flange side thrust on the many sharp curves to be negotiated, by the incorporation of a lateral spring anchorage between the main bogies and by the spring-loaded guiding characteristics built into the pony truck.

Signalling of Shunting Movements

AS Colonel McMullen points out in his report on the Ardsley collision between an express train and a stationary light engine last October, the primary cause was the absence there of any clear block regulation covering the movement of engines shunting ahead of the starting signal. This had given rise to the undesirable practice of clearing the starting signal without block signalling such engines forward; and this practice was either unknown to or condoned by the local supervisory staff. On this occasion the signalman forgot the light engine, and let the express run into it. The new block regulations, to be published shortly, will generally cover such movements at signal-boxes such as Ardsley Station, while block controls and additional track circuits, to be installed at Ardsley and elsewhere, should eliminate the possibility of this kind of accident. Colonel McMullen points out that most casualties to passengers were caused by the tables and seats in the open gangway coaches of the express becoming dislodged. Improvements are being made to minimise this risk.

Failure to Observe Regulation

ANOTHER contributory cause of the Ardsley collision was the failure of the driver of the light engine to carry out Rule 55(*b*).This provides that when a train is allowed to enter the section ahead for shunting purposes and then comes to a stand, the driver must at once send his fireman to the signalbox, This was very often not being done at Ardsley, and again this irregularity had been either overlooked or condoned. Colonel McMullen understands that although a track circuit is to be provided at the shunting signal concerned, it is the intention to continue to enforce Rule 55(*b*) at this and other places. He rightly points out that the failure to authorise the exemption to a rule, when justified, will lead to disrespect for the rule. Colonel McMullen recommends that the whole question should be considered fully from this angle. This raises a question of policy, which demands the most careful consideration. One can easily impose safeguards to the point where they begin to defeat their object.

Transport Wages

THIS week sees two new moves in union activity to improve existing rates of transport pay. At a meeting of the Railway Shopmen's National Council held on August 23, the Employees' Side turned down an offer from the British Transport Commission to effect certain increases in the pay of railway workshop staff, and proposals for more pay and better weekend working conditions for London Transport bus drivers and conductors were made on the previous day during talks between union leaders and the London Transport Executive.

At the meeting of the Railway Shopmen's National Council, the British Transport Commission offered increases ranging from 5s. a week for unskilled men to 6s. a week for skilled men and an improvement in the London allowance with effect from July 4. The Employees' Side said that it could not accept the offer as a basis for discussion unless a more favourable date of operation could be given and no agreement was reached. Commenting later on the talks, Mr. J. Matthews, President of the Confederation of Shipbuilding & Engineering Unions, one of the unions represented at the meeting, said that had the Commission been prepared to pay the increase from January 4, the same date as that from which other British Railways employees received wage advances recently, the unions would have opened negotiations on the amount, but as it was, this had not been discussed.

The Commission chose the date of July 4 because it marked the beginning of the first pay period after the claim was submitted. Earlier this year, it had given the railway shop workers an increase of 5 per cent from January 11. This was the same amount and date as for the interim increase given to other British Railways employees, but the Commission was at pains to point out that the shopmen were not covered by the Guillebaud Report and could not expect to receive the same wage improvements as a matter of course. The unions never accepted this point of view and now are directly challenging it. The final settlement for other railway workers, which gave many of them another 3 per cent, was applied from January 4, and it appears that the shopmen's unions do not intend to accept anything less.

The new proposals for London Transport bus drivers and conductors were made at a meeting which had been convened to consider the Executive's staff shortage in these grades, now estimated at between 5,000 and 6,000. They do not constitute a claim—they were merely suggested as possible measures in a campaign to attract more staff. During the talks, the unions pointed out that the differential between London bus drivers and conductors and Underground motormen and guards had increased substantially over the past few years and that today a top-grade motorman's basic pay was 54s. a week more than a bus driver with the maximum basic wage of £10 12s. In this connection, it is interesting to recall that the pre-war differential was practically non-existent—a mere matter of three shillings—and that the admittedly considerable differential referred to above is reflected in varying degrees between bus and railway workers throughout the country. Nevertheless, no formal claim as yet has been made by the union leaders concerned, who have exercised remarkable restraint in the face of more or less constant pressure in this direction from a limited number of garages in the London area. Union attempts to maintain differentials cause regular headaches to the Chancellor of the Exchequer. It may be that ultimately they will be covered by some form of national wages policy embodying the principle of the comparative wage. This, favoured by some unions, does not meet with T.U.C. approval.

Motive Power Considerations in Asia

IN some respects the changing face of the Asiatic railway scene is akin to that in Africa, discussed in our last week's issue, in that one or two railway systems in their general operation are like those of Western Europe; but there any general similarity ends. Apart from Japan, where the National Railways by reason of traffic density, concentration of lines, equipment and staff characteristics are different from all others in the continent, there is still much greater variation between Asiatic lines than there is between African lines with the two exceptions of the Union of South Africa and Egypt as mentioned last week.

There are two immense railway systems in Asia—those of India and China—on which the impact of new forms of motive power has as yet been scarcely felt. Both are on the eve of big developments which in ten or a dozen years will probably have revolutionised transport methods, though perhaps it is just as true to say that rapidly developing traffic and ideas of full railway operation are calling for new motive power. In both cases national manufacture of steam locomotives has been substantial, and is now in the early stages of change-over to electric and diesel locomotive manufacture. But in India there still exists some market for foreign builders of diesel locomotives to work in conjunction with Indian factories, and the competition for this at the moment is not far short of cut-throat. The Indian Railways have already indicated in quite definite terms their preferences for certain types; but high-level pressures and additional loans have been made for the support of foreign manufacturers having quite other types for sale, so much so that orders for these other types are being placed. In China the position is quite different in that while a few prototypes of 600 b.h.p. and thereabouts have been evolved entirely by Chinese works, the standard main-line locomotive is in essence the U.S.S.R. class TE-3 2,000 b.h.p. unit, with many parts and even complete units supplied by Soviet industry. The same applies to the diesel power in the Outer Mongolian Railway, on which at least 30 large 2,000 b.h.p. diesel-electric locomotives from Soviet factories are now running.

The value of diesel locomotives has been recognised by the Indian Railways to be on a wide scale, not merely in the haulage of heavy mineral block trains of 3,000 to 7,000 tons in weight; that is why standard designs for 1,000/1,200 b.h.p. diesel-hydraulic locomotives for the metre-gauge system have been prepared, along with the broad-gauge 2,600 b.h.p. designs intended for multiple-unit working as necessary. It is the general advantages of diesel power expected by the Indian authorities from the metre-gauge stock which apply more directly to nearly all other Asiatic railway systems, though already two of them—the Iranian State Railways and the Manila Railroad in the Philippines—are already fully diesel operated, the former being especially notable in that except for a few port shunters all locomotives actually in traffic are of one build, and with one basic engine type, only the number of cylinders varying.

In Turkey wider application of diesel power has been deferred only because of financial difficulties in the obtaining of foreign credit, though 13 shunters of 650 b.h.p. are now under construction with Eurofima finance for hire-purchase to the Turkish State Railways, and a handful of 3,000 b.h.p. diesel-hydraulic locomotives are being supplied to a Turkish Ministry from Germany. Thailand has a long history in diesel working, dating back to 1927, and here all new motive power is of diesel type, obtained as credit can be obtained; all recent deliveries have been from Japanese builders. Here increased difficulties of getting wood fuel economically for the steam locomotives, and questions of general economies are the main reasons for the advance of diesels, but such units have here the additional advantage of being brought on to a system with a long and excellent tradition of diesel locomotive maintenance, a tradition found also in Ceylon, where 800 b.h.p. trailer-hauling railcars, 40 in number, have been the most important recent acquisitions.

Theoretically these general advantages of diesels apply to the remaining countries, though reinforced in Iraq, which as yet is running no line-service diesels, by water difficulties; but in several territories, for example Indonesia, these theoretical matters are as yet of no importance beside the political situation, which is quite unstable. These long continued conditions not only make foreign credits unlikely, they also ruin all chances of building up competent and enthusiastic maintenance and repair personnel. There is going to be no rapid change-over of motive power in the next few years in a large part of Asia, but that will not be by reason of any defects in the non-steam forms of locomotives.

Serving New Communities

THE new passenger station at Harlow, on the Cambridge main line of the Great Eastern Line of the British Railways, Eastern Region, described in our August 12 issue, is the first major work to serve one of the new towns conceived by the Labour Government of 1945-50. When the frequent multiple-unit electric trains start to run in November, the new and growing community, of which the population is expected to reach 80,000 by 1965, will be well served. An example of steps taken to cater for the goods traffic of a new residential and industrial community is the goods station being built between Gatwick Airport and Three Bridges, on the Brighton main line of the Southern Region, to serve Crawley, Sussex. Passengers from and to the new town at present must use Crawley Station, on the Three Bridges to Horsham line, or Three Bridges, on the main line. The former structure, built over a century ago to serve the village of Crawley, is now, or soon will be, inadequate for its traffic. If the town planning authorities agree, a new station can be built between the present Crawley and Three Bridges Stations, with convenient access to the shopping centre. Another new town, rather less well served by rail, is Basildon, Essex, to which the nearest stations are Laindon and Pitsea, on the London, Tilbury & Southend Line of the Eastern Region.

The fact that most of the new towns of Great Britain are not particularly well located for convenient access by rail is not the result of any lack of enterprise on the part of officers of the main-line railways in early days after the last war, and of British Railways since nationalisation. The new towns were planned as self-contained units. It seems to have been expected that the population of working age would be employed in the factories and offices in the urban area. It was not foreseen that growth of population would cause people, more particularly the younger generation, to seek work elsewhere, perhaps in London or other centres offering greater opportunities for advancement or more congenial surroundings. Nor do the planners seem to have envisaged the desire of the inhabitants to visit other places by rail for shopping or recreation. Apart from conveyance of raw materials to, and despatch of products from, the factories, there was some failure to realise that all urban communities needed rail transport for fuel, foodstuffs, and consumer goods. Had there been closer consultation with railway managements in the early stages, more weight might have been given to these factors. Several new towns might have been rather differently planned, if not on other sites at least with better railway connections.

The failure to place factory areas in better relation to the railways is unfortunate. A good many manufacturers who now receive and consign goods by road partly because factories are not served by sidings, or because they feel themselves remote from railhead, might, with better planning of factory areas, have made more use of railways. The work of the railway commercial staffs in securing traffic is made harder because of faulty planning in early days, and there is some difficulty in providing attractive goods services.

As to passengers, the example might have been followed of Canberra, where provision was made for a station in the original planning of the city. To serve Chandigarh, the new capital of the East Punjab, a deviation was constructed of the Delhi to Kalka main line of the Northern Railway of India, and a new station planned, of considerable architectural merit. Harlow Station shows the excellence of the designs which British Railways architects and engineers can create; but stations equally good in design, if in, or nearer to, the centres of the communities they serve, could contribute to the amenities, apart from their convenience for the travelling public.

It may be that the new towns of Britain will remain largely self-contained, and be dormitories for only a minority of the residents. Experience at Crawley, and at Bracknell, on the Southern Region electrified line from Waterloo to Reading, seems to show that daily travel to work elsewhere will increase, as may travel to schools and colleges in other towns, as the population of schoolchildren and students increases.

One may wonder whether town planners, whether of new communities at a national level or of local housing developments, realise the need for railway communication. There are reports of demands of stations or halts to serve housing estates which have grown up near railways. Often these are provided, but it is not always practicable to give the facilities requested, sometimes because the railway authorities were not consulted in the first place as to the site, and rail service is impracticable for traffic reasons. Railways have an important part to play in serving newly built-up areas, but the planning authorities do not seem always to realise this.

Train Heating in Diesel Traction

TRANSITION from steam to diesel motive power has given rise to innumerable problems, none of which exceed in importance that arising from train-heating, for the essential simplicity of the heating provided by steam locomotives cannot be retained. As with so many questions today there is no single answer, not even technically; and always any technical preference must be judged against associated economic backgrounds and operating practices. Methods in use today are four-fold, viz., train-heating boiler on the locomotive; oil-fired automatically-controlled train-heating boiler in a separate car or wagon; coal-fired steam heating boiler on a separate wagon; and electric heating from a generator on the locomotive and driven either directly by the main engine or by a separate auxiliary diesel-generator group.

The coal-fired steam boiler wagon needs a stoker on the wagon all the time. It is used principally in Italy, for trains hauled by electric locomotives more than for trains hauled by diesel locomotives. Economically, both in regard to stoker's wages and cost of haulage, it may not be very good; but for heat put into the train personal experience shows it to be far superior to all other methods, and probably with but light manual work on the part of the stoker. Electric train heating means are for more specialised applications, where the stock hauled is also hauled by electric locomotives; but with the spread of electrification this means must increase in the field of diesel traction because of common use of coaches and the requirements of through coaches hauled in a single journey by both forms of motive power. Hitherto, an electric heating generator incorporated in the main engine-generator group has been applied most widely, for example in the British Railways 1,550 b.h.p. Type 3 diesel-electric locomotives working in the Southern Region; but there are examples of the auxiliary diesel-electric heating set, as in the Motala diesel-turbine locomotive in Sweden.

Various reasons can be given in various countries for the use of a separate car containing an oil-fired automatically-controlled boiler, with its own fuel tank and water tank. Where the locomotives concerned are mainly engaged in freight haulage, and where the winter is short, it may be proved economic to use these separate wagons rather than instal the boiler on the locomotive itself and use it only 25 per cent of the year, and the decision may be influenced also by the improvement in locomotive design and characteristics when weight and space allowances do not have to be made for a boiler, more fuel, and several hundred gallons of water. And though it is usually controls which are responsible for most failures of train-heating equipment in diesel locomotive-hauled trains, there is much greater accessibility of all equipment in a separate wagon. Occasionally, there are other reasons for the use of boiler wagons. For railways experiencing very cold weather and running really heavy trains, it may not be practicable to provide the space and countenance the weight of a boiler of, say, 3,000 lb. an hr. evaporative capacity along with water tanks of suitable size.

Installation of train-heating boilers on diesel locomotives involves certain requirements not known in stationary applications, mainly in regard to space and weight, but also in ability to withstand vibration, to produce steam quickly from cold or near cold, and to deal satisfactorily with variable load. Tech-

nically the question today is: fire-tube or water-tube ? No single solution has yet come forward, and it is probable that so far one is as good as another. Lighter weight is claimed for the water-tube models, but when consideration is given to the weight of boiler, contained water, train-heating water and tanks there is little in it. Water-tube types are supposed to be more susceptible to a succession of different waters, but here, again, the issue is not clear-cut, for many railways would consider water treatment a *sine qua non* whatever the type of heating boiler. At first sight, the application of a waste-heat boiler, to make use of the 30-odd per cent of the heat in the engine fuel going out through the exhaust, has attraction. But one must record that as yet no satisfactory installation has been made of such a boiler in a diesel locomotive, though there are a few in railcars which provide enough heat for the car and trailers, even during lengthy station stops.

Southern Region Winter Timetable

AS is customary, the Southern Region timetable book, operative from September 12, is the first of the series to appear, and with the pattern of even-interval services so firmly established, it is as usual with a minimum of change in the services. Indeed, there is one major alteration only, and that is the much later start of the afternoon Continental service from Victoria. Last winter, departure was at 12.30 p.m. for ordinary passengers and 1 p.m. (the " Golden Arrow ") for Pullman passengers; during the summer the " Golden Arrow " reverted to its former 11 a.m. start, and the ordinary train to 10.30 a.m., with afternoon departures for Paris at 1.30 and 2 p.m.

From October 2 onwards afternoon passengers will leave Victoria at 2.30 p.m., and will reach Paris at 10.58 p.m.; allowing for the difference of 1 hr. between British and French winter time, this will mean a journey of 7 hr. 28 min., 42 min. quicker than for ordinary passengers last winter, and 12 min. quicker than the Pullman times (though in future no Pullman cars will run in this service on either side of the Channel). The 2.30 p.m. from Victoria will connect at Calais also with train CB for Switzerland, and will give an acceleration of 45 min. to Basle, arriving there at 6.0 instead of 5.15 a.m. In summer, the Victoria departure will be 3.30 p.m.

As to home services, a through portion for Hove and Worthing, detached at Haywards Heath, will be attached to the 9.28 p.m. from Victoria, reaching these stations 10 and 15 min. earlier than as now via Brighton, at 10.43 and 11 p.m. respectively. Pullman facilities will be withdrawn from the 11 p.m. from Victoria to Brighton, and the midnight train down and the 10.25 a.m. up will have buffet instead of Pullman facilities. Miniature buffet cars are to be provided on the through Portsmouth Harbour-Cardiff trains, at 9.30 and 11.50 a.m. and 5.54 p.m. from Portsmouth and 10.30 a.m., 1 p.m. and 4.25 p.m. from Cardiff. In the Western Division, the restaurant cars run on Sundays during the summer on the 4 p.m. from Waterloo to Exeter will be continued through the winter.

As to cross-country facilities, the through restaurant car trains between Ramsgate, Margate, Hastings, Eastbourne, and Brighton and Birmingham and Wolverhampton, also between Bournemouth and Leicester, Nottingham, Sheffield, and York will be discontinued during the months from November to April inclusive, as last winter. The same will apply to the 10.55 a.m. from Bristol to Portsmouth Harbour *via* Salisbury. The through Bournemouth-Birmingham-Birkenhead train will continue to run daily, with restaurant car facilities throughout; for much of last winter this train was combined with a Paddington-Wolverhampton express between Banbury and Wolverhampton, and the restaurant cars were available only between these points.

In the London area, one change which was introduced in the summer timetable now is being made permanent. It is the extension of the peak-hour service at 20-min. intervals between Victoria and Beckenham Junction *via* Balham and the Crystal Palace to the off-peak hours. During the latter the trains leave Victoria at 0 and 30 min. past each hr., and Beckenham Junction at 11 and 41 min. past the hr. This arrangement replaces the previous shuttle service between Crystal Palace and Beckenham Junction, and helps to provide a service every 15 min. between Gipsy Hill, West Norwood, Streatham Hill, and Victoria.

Victorian Railways Apprentice Training

THE construction, in 1960, of an overpass to enable road traffic to operate with greater freedom over the busy Melbourne Road crossing at Newport necessitated the removal of the Victorian Railways Technical College, that had been the training centre for thousands of railway tradesmen and engineers. The new college, which is sited close to actual workshop activities, was opened recently by Sir Arthur Warner, the Minister of Transport.

At the opening ceremony Mr. E. H. Brownhill, Chairman of the Victorian Railways Commissioners, said it was most appropriate that the new technical college came into being 100 years after apprentices first began training at the old railway workshop at Williamstown. In those days, he said, conditions for apprentices were not as good as they were now. Training covered seven years, and during the first 12 months the apprentice received no pay. Over the years apprentices had been the solid core of the efficient railway organisation.

Practical trade instruction in turning and fitting, electrical fitting, and welding can now be given in a separate section of the college instead of being conducted in various sections of the Newport Workshops. Provision has been made to accommodate the Supervisor of Apprentices and his staff in the new building, thus affording even closer collaboration than previously between the college staff and this officer.

Every effort has been made to provide ample provision for future requirements; the 8,650 sq. ft. of floor space in the main college building and 6,000 sq. ft. in the practical trades section compares more than favourably with the 7,200 sq. ft. of the old building. During their first three years on the job, 300 to 400 apprentices in the metropolitan area in the grades of fitter and turner, electrical fitter, boilermaker, car and wagon builder, or sailmaker spend from eight to 10 hr. weekly at the college. All class work has a railway emphasis and is designed to help the student in his general work.

When apprentices enrol, they are graded according to their educational qualifications and commence in a class at the appropriate level. Separate classes are provided for car and wagon builders, boilermakers, turner and fitters, and electrical fitters. Each apprentice shares in the educational programme common to his group and, in addition, receives special training in his own chosen occupation.

At the present time, training is divided into technical courses for those capable of reaching professional status and trade courses. A technical course covers three years of the education department's certificate course and up to diploma standard in certain subjects, while the trade course is similar to the education department's apprenticeship commission trade course. A new course to be known as a technician's course for outstanding trade course students is being planned. This will be similar to the education department's technicians certificate course. Trade classes are conducted at selected technical colleges where instruction cannot be given with departmental facilities.

Throughout industry the railway-trained apprentice has a first-class reputation. It is the degree of personal interest that has helped to maintain the high standard of students passing through the Victorian Railways Technical College, as it is felt that the future of the department to a great extent lies in the hands of its apprentices.

Electrification in Western Germany

ELECTRIFIED lines form some 12 per cent of the route mileage of the German Federal Railway. The total mileage now converted is some 2,200, nearly all at 15,000 V., 16⅔ cycles. The adverse financial situation of the railway since the war is one reason why the proportion is not higher. Nearly 300 miles were converted in 1959, including the sections from Regensburg to Passau and from Cologne to Düsseldorf. The former is an important link in the through route between Belgium, Holland, the Ruhr, the Rhineland, Frankfurt/Main, and Vienna. Electrification of the Cologne–Düsseldorf main line with reopening for service of the two additional tracks, making four, on the Hohenzollern Bridge over the Rhine at Cologne, was an important step in improving facilities in North-West Germany. There is now electric haulage throughout between the Ruhr, South Germany, Austria, and Switzerland. The 35-mile Höllental line in the Black Forest,

electrified in 1936 at 20 kV., 50 cycles, was converted last May to 15,000 V., 16⅔ cycles.

After negotiations with the Government of the Province of North Rhine/Westphalia, on sharing the cost of the work, the Federal Railway is now electrifying its 35-mile main line from Duisberg *via* Wanne Eickel to Dortmund. The route traverses a highly populated industrialised area, and much civil engineering work has been necessary to obtain clearances through overline bridges. Various other sections in the Ruhr area also are being electrified. The most important of these is from Düsseldorf *via* Wuppertal to Hamm, 90 miles, and from Hagen to Siegen, 80 miles. Allowance for colliery subsidences has been made in erection of the supports for overhead equipment, and close liaison has been necessary with mine authorities. Current for these lines is to be supplied partly by the Rheinisch–Westfälische Elektrizitätswerke and partly by the Technische Werke at Düsseldorf, where there is a Federal Railway generating station with an output of 25,000 kW. These are connected with the South German grid, which is supplied in part from hydro-electric sources in the Bavarian Alps. Railway-owned sub-stations are to be erected or enlarged with a view to future electrification in the area. Because of corrosion from fumes from industrial plants in the Ruhr area, a special type of insulator has been devised and has proved successful on the Dortmund–Essen–Duisburg line.

Further south, work in hand includes the main line along the right bank of the Rhine from Wiesbaden to Osterfeld Süd, some 140 miles, which will afford an alternative to the already electrified left bank route between North and South Germany *via* Coblenz. Several sections in the Saar basin also are being converted.

Negotiations are in progress between the Federal Railway and the provincial authorities over electrification at 15,000 V., 16⅔ cycles, of the heavily-trafficked main line between Bremen and Hamburg in the north, and Gemünden, near Würzburg, *via* Hanover and Göttingen. The mileage involved is about 500. The cost is estimated at some £90,000,000, spread over five years. Much work will be necessary to obtain clearances through the many tunnels between Göttingen and Fulda. Preparatory work is in hand, and the 1960–61 winter timetables include recovery margins on account of work in the tunnels. In deciding on future electrification, the Federal Railway management regards consumption of 480,000 kWh. per mile per annum as the figure justifying conversion.

The " California Zephyr "

(*By a correspondent*)

ON March 21, 1949, a new trans-continental train made its first journey from Chicago to San Francisco. The Burlington Railroad hauled it for 1,039 miles from Chicago to Denver in Colorado, 5,280 ft. above sea level. The Rio Grande then moved the train through the Moffat Tunnel, at a height of 9,239 ft., to Granby, 75 miles. Next followed a run of 235 miles alongside the Colorado River to Westwater in Utah, and at Salt Lake City, 570 miles from Denver, the Western Pacific took charge and completed the long run of 2,530 miles.

Known as the " California Zephyr," the train ran daily for 10 years to March 21, 1959, crossing a sister train from San Francisco about halfway between terminals. It has become an American institution. The Rio Grande records in its 1959 report that over these ten years it carried 1,554,658 passengers on its main line through the Rockies; of 18,520,000 train miles run between Lake Michigan and the Golden Gate, the Rio Grande worked 4,440,680, nearly 24 per cent. The average daily occupancy of accommodation on the two Zephyrs probably set up a record at 89·4 per cent.

The report has a good picture of a Zephyr, with vista-dome cars, passing through Glenwood Canyon in Colorado, where a monument " commemorates the fact that the Rio Grande's scenic route through the Rockies was the inspiration for the vista-dome rail car." These cars are popular, but do not earn much revenue, as the Rio Grande's total passenger takings were merely $2·9 million.

Depicted in the report also are two westbound freight trains, hauled by four diesel units, on the Royal Gorge route, which rises to a height of 10,000 feet at Tennessee Pass—the highest point on any main line in the U.S.A. Trains of that stamp produced a revenue of $69·8 million for the Rio Grande last year and held its operating ratio down to a trifle over 67 per cent. In a difficult terrain the freight locomotives hauled 67 wagons, three fewer than in 1958, but raised freight train speed to 20·9 m.p.h. The economy of the United States is still built around the railroad freight wagon.

Letters to the Editor

(*The Editor is not responsible for opinions of correspondents*)

Organisation of British Railways

August 20

SIR,—In the summary of the Report of British Railways by the Select Committee on Nationalised Industries published in your issue of July 29, reference is made to changes in organisation at Regional levels which appear to be accepted.

Seeing, however, that the weight of the evidence taken seems to have come from high-ranking members of the British Transport Commission and staff, may one not conclude that these senior officials have attempted to justify the organisation which they have set up ? Many members of the staff of lower rank do not agree with them. A one-sided viewpoint, therefore, seems to have been obtained.

Yours faithfully,

C. W. HERBERT

26, Princes Road, Harrow

The Waterloo-Hounslow Line

August 22

SIR,—I have followed the correspondence between Mr. A. E. Durrant and Mr. F. D. Y. Faulkner, in your July 15, August 5 and 19 issues, with interest. Surely the point is this : People do not avoid Hounslow line trains because they are expensive (they are no more expensive than elsewhere), infrequent (many well-patronised suburban services run at the same frequency), or inconveniently timed. The potential traffic just is not there. Anyone who travels over the line, with its environment of sports grounds, factories, schools, and office blocks, will see why.

No amount of fare cutting can attract traffic which is non-existent, or " compete " with services running in a different direction. This was proved before the war, when the fare of 9d. (cheap-day return) for the 12¼ miles to Isleworth compared with 1s. 2d. for the identical distance to Strawberry Hill, and business trains ran every 15 min. Even now the traffic density on the half-hourly service is not sufficient at any time to result in standing passengers.

Yours faithfully,

L. A. MACK

13, Upper Grotto Road,
Twickenham, Middlesex

Southern Region Electric Stock

August 16

SIR,—After a third excursion in the Southern Region Kent Coast multiple-unit trains, I am appalled at the low riding qualities of this stock.

Why such standards were accepted in the first place is hard to understand; if the new standard E.S.C. Commonwealth bogie was not available at the time of the construction of the stock for Phase 1 of the Southern Region electrification, then surely the answer would be the adoption of the Gresley double-bolster bogie, which would have been readily available. The riding qualities of this bogie are infinitely superior to either the Eastleigh bogie or the British Railways standard bogie, which are all the British Transport Commission at present can find to offer. The sooner the Commission rejects the standard bogie and returns to the Gresley double-bolster design the better.

Yours faithfully,

C. M. JUNGDORF

Cambridge

THE SCRAP HEAP

Unsolicited Testimonial

"I prefer to go by British Railways, myself—*and* I don't think the restaurant cars are bad, either!"—*Mr. Kenneth Horne, in "Does the Team Think?" (B.B.C.)*

Return to Rail

America's famous circus, Ringling Bros., Barnum & Bailey, has gone back to rail transport this year after three years on the United States highways. When the circus, in 1956, abandoned its big tent in favour of indoor operations, it automatically cut its transport requirements by nearly 80 per cent. The special circus rail wagons went into storage at winter quarters. Except for the elephants, that travelled from city to city in three railway baggage vans, the show moved by diesel lorries, buses, and motorcars. The most serious drawback was that the circus no longer operated on a co-ordinated master schedule. Individuals would be delayed by breakdowns, others would get lost, traffic slowed still others. With steadily increasing business from indoor operations, the circus decided, recently, to switch back to rail transport.

Railway Architecture at Newcastle

The nineteenth century threw bridge after bridge across the river [at Newcastle-on-Tyne] and, with a terrifying optimism .... coolly built a rail link across the old city between the castle keep and its gate-house, spanning the old streets at an immense height. All these, acting together, have produced today's Newcastle: a typical view is of steps, alleys, smooth classical buildings, railway bridges, all in the same view. . . . The Central Station is Dobson's last gift to the city he served so well. Its simple arched *porte-cochère*, seen obliquely, fills the end of half-a-dozen Newcastle streets; with the immense curved space inside it seems to epitomise the refusal to compromise common sense and natural dignity for the sake of the flashy *tour-de-force*. It would have been so easy to pretend that Newcastle was a terminus, and give it a grand palace-front. Instead, the sooty arches are content to echo the shape of the platforms. The effect is so understated that it takes some time to sink in, but once comprehended it never palls.—*Ian Nairn in a B.B.C. broadcast.*

[Newcastle Central was built at the joint expense of the York, Newcastle & Berwick and Newcastle & Carlisle Railways. Trains of the former company began using the station on August 30, 1850, and those of the latter on January 1, 1851.—ED., *R.G.*]

Wot! No Kangaroo?

A wide range of goods were offered for sale at the Victorian Railways monthly auction of unclaimed property in July. In addition to the usual kitbags, suitcases, umbrellas, paint, canned fish and farm requirements, other items to go under the hammer included a four-valve euphonium, 58 bottles of cough mixture, a hearing aid (incomplete), a guitar and case, two tennis racquets, archer's bow, two aqua-vests, a canteen of cutlery, a mantle, a transistor radio, and 10 second-hand bicycles.

The Price of Coal

The high prices which have ruled for coal for some time past have been felt by no industry more seriously than by our railways, and the disappointment which has followed the recent series of dividend announcements is, in large part, accounted for by the extra cost of fuel. Unfortunately coal is an absolute necessity for railway working, and so the companies cannot escape the full effects of the rise in price. Even the Great Eastern Company, which has some of its locomotives so constructed that they can consume oil as well as coal, has found the prices for the former put up against it so that it cannot effect any saving in that direction.—*From "The Financial Times," August* 15, 1900.

[The first British oil-fired locomotive was built for the Great Eastern Railway in 1893, by James Holden, and a later one was named *Petrolea*. The fuel was obtained from the waste products of the manufacture of oil gas for carriage lighting. Some 60 locomotives were converted to burn oil on the Holden system, but the apparatus was removed when the price of oil rose to an uneconomic level.—ED., *R.G.*]

Alternative Forms of Transport

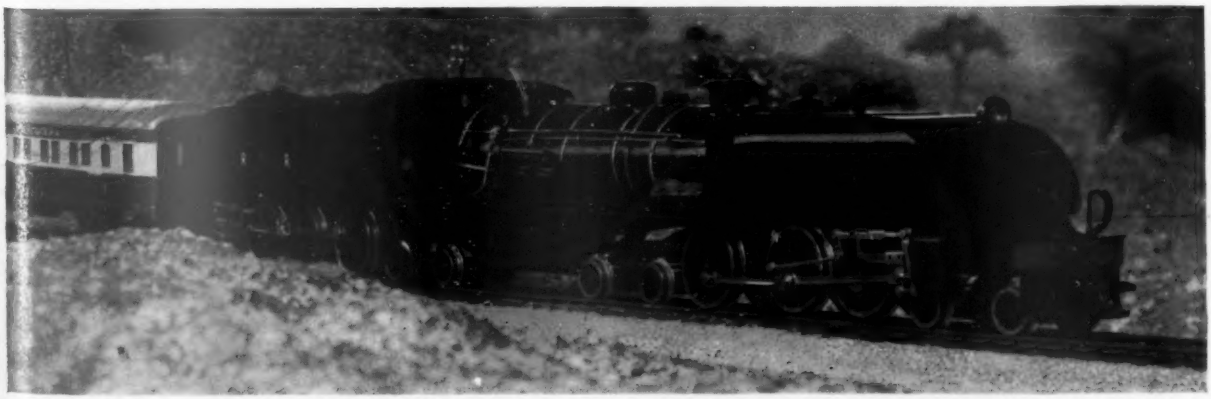
My life used to be ruled by No. 11 buses. Now it runs on two wheels. Everything is governed by my new (to me anyway) bicycle. I bought it for 30s. in Hove. It is elegant, vintage, very high, and the brake goes on when I backpedal. It seemed an unfair test to ride it all the way to London. Besides, I've never been much good on a bicycle; so I put it on a train and drove back.—*Mary Rose Ferguson in "The Daily Telegraph."*

Historic Locomotive Preserved

An historic Canadian National Railways locomotive was presented to the Canadian Railroad Historical Association on July 21 as a contribution to the Association's museum. The presentation was made by Mr. S. F. Dingle, C.N.R., Vice-President, Operation, to Dr. R. V. V. Nicholls, President of the Association, at Turcot Yards. Dr. Nicholls said the locomotive, No. 1165, would have a place of honour among the relics which the Association was collecting for the museum, to be located in the vicinity of Montreal. No. 1165 is a 4–6–0 with direct historical links with the era of railway construction in Canada shortly after the turn of the century. It was one of the most versatile engines to operate over C.N.R. lines. Built in 1912 for O'Brien, MacDougall & O'Gorman, the 57-ft. locomotive was first used on construction duties when the National Trans-continental Railway was being built between Moncton and Quebec, before the war of 1914-18.

Model of Rhodesian Beyer-Garratt

The model, 15¼ in. long, shown in the illustration, of a Rhodesia Railways "15th" class Beyer-Garratt locomotive, was made by Mr. F. H. Sibson, a Bulawayo farmer. It has been exhibited at Rhodesia Railways pavilions at shows in the two Rhodesias. The "15th" class engines are 92 ft. 4 in. long and weigh 187 tons.



Scale model of "15th" class Beyer-Garratt locomotive shown in Rhodesia Railways displays

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

New Harbour Cranes

A start has been made with the delivery of 63 new harbour cranes ordered by the South African Railways & Harbours at an estimated total cost of £1,896,000. The cranes are considerably higher than those at present in service and their radii will be about 75 ft., which will facilitate the working of the larger vessels now calling at Union ports. The orders are for 58 cranes of 4-ton capacity and five of 15-ton capacity. Durban will get 23 of 4-ton and two of 15-ton capacity; East London four of 4-ton and one of 15-ton capacity; Port Elizabeth 14 of 4-ton and one of 15-ton capacity; Cape Town eight of 4-ton capacity; and Walvis Bay nine of 4-ton and one 15-ton capacity. The cranes are being supplied by four different contractors. All the steelwork and part of the machinery will be of South African manufacture.

EAST AFRICA

Industrial Relations Inquiry

Mr. W. A. Whitson has been appointed by the Secretary of State for Kenya to be Commissioner of an inquiry into the state of industrial relations in the East African Railways & Harbours, with particular reference to the nature and suitability of the machinery needed for sound industrial relations.

The appointment has been made in accordance with the terms of settlement of the strikes of African staff in Tanganyika and the trade disputes between African staff and the management of the lines in Kenya and Uganda.

Mr. Whitson was secretary of the British Transport Commission's Committee of Inquiry under the chairmanship of Mr. C. W. Guillebaud. He was formerly a senior conciliation officer in the Ministry of Labour. He is to submit his report to the chairman of the High Commission by the end of October.

Kilosa–Mikumi Line Opened

The new branch line from Kilosa on the Tanganyika Central Line to Mikumi, East African Railways & Harbours, was opened for traffic on August 15. The line, costing in the region of £715,000, is 44 miles in length and provides a new railhead for the traffic of the Southern Highlands of Tanganyika, which was formerly dealt with at Morogoro. It also advances the railhead to within 24 miles of the Kilombera Valley sugar project. There is one intermediate station on the section, Mbamba, 19 miles from Kilosa.

RHODESIA

Record Movement of Freight

On two days recently Rhodesia Railways broke the record for the movement of traffic on any section of the line. On August 3, 19,654 gross tons were despatched southwards from Wankie and on August 5, 20,988 tons. Two extra trains were needed on the first occasion and three on the second to handle the additional traffic. In the northward direction the tonnages despatched from Wankie were 11,645 and 12,057 tons, but these figures are not records. On an average day, southbound traffic from the coalfields area amounts to between 12,000 and 16,000 tons.

VICTORIA

New Technical College Opened

The new Victorian Railways' Technical College at Newport Workshops was recently opened by the Minister of Transport, Sir Arthur Warner. Among those invited to attend were members of the first class of apprentices to be trained by the original Victorian Railways' Technical College. They had joined the railways in October, 1921. Also present was their principal, Mr. O. E. Nilssen, now Chief Inspector of Technical Schools and President of the Apprenticeship Commission.

Grade Separation Schemes

Major grade separation projects in the metropolitan area are making good progress. Work on the overpass at Hampshire Road, Sunshine, the estimated cost of which is £300,000, is being carried out in conjunction with the construction of the Melbourne-Albury standard gauge scheme. Work on the overpass has reached the stage where subway construction is in progress. A goods shed has been moved and the goods yard rearranged. Following the completion of this preliminary work, concrete will be poured for the first retaining wall of the road approach. Excellent progress is also being made with the new overpass at Melbourne Road level crossing, Newport.

CHINA

Diesel Passenger Stock

A new diesel multiple-unit train with double-deck carriages and an all-woman crew has been put into service in the Pekin area as part of a plan to speed up suburban services. It is called the "East Wind." The six-car train has four double-deck coaches and two power cars. Each coach has seats for 198 passengers. The stock was built by the Chinese rolling stock plant at Tsingtao.

PORTUGAL

Proposed Bridge over Tagus

Schemes for rail connections between Lisbon and the area south of the River Tagus include a tunnel and bridges at various points. The Government recently invited submission of designs. That of the U.S.A. Steel Export Company is reported to be preferred, subject to approval of detailed plans. It is for a suspension bridge with a central span over 3,300 ft. long between two towers 700 ft. high, which will support the cables. The two lateral spans each will be 1,500 ft. long. The bridge was designed in the first instance for road traffic only, but provision is to be made for a railway. The

Goods train hauled by class "26" locomotive crossing the bridge which carries the Kilosa–Mikumi line over the Mkondoa river

World Bank and the Banque Seligman in Paris are to provide the capital for the bridge construction.

SWITZERLAND

Swiss Federal Couchette Coaches

The first has appeared of a series of second class couchette coaches which the Swiss Federal Railways have on order for its share in various international passenger services. Each coach has nine compartments, with six couchettes in each. The vehicles conform in dimensions with the standard Swiss lightweight stock, and are fitted at the ends with the latest type of rubber vestibule connection. The first cars have gone into service between Basle and Vienna.

New Sudöstbahn Stock

Two new motor coaches are in service on the South-Eastern Railway, one of 2,800 and the other of 2,200 h.p. They can handle trains of 155 *tonnes* up the 1 in 20 ruling gradient of this line. Handsomely finished externally in green and cream, they are named *Wädenswil* and *Einsiedeln*, the two principal towns on the line, and carry coloured representations of the arms of these towns.

The 2,800-h.p. motor coach forms part of a new four-coach push-and-pull set of which the remainder comprises a composite, a second with central kitchen and buffet compartment, and a second, the whole seating 155 second and 36 first class passengers. The furnishing and décor of the first class open section is the equal of the finest in Switzerland today, although the total extent of the railway concerned is no more than 29 route miles.

This train normally works, in conjunction with the Bodensee-Toggenburg Railway, a through service with buffet car trains between Lucerne, Arth-Goldau, Rapperswil, the Ricken Tunnel, St. Gallen and Romanshorn. The new train also is used for special excursion workings, and when running over suitable sections of the Swiss Federal Railways may travel at speeds up to 78 m.p.h.

AUSTRIA

Rail Traffic over the Brenner

Traffic over the Brenner is of particular importance to the entire Austrian transport economy. In 1959, about 200,000 loaded wagons and about 165,000 empties passed over the Brenner. The net load carried amounted to 2,500,000 tons, of which 1,972,000 was transit traffic. Compared with 1950, the increase in net load was 115 per cent, and 158 per cent in the case of goods in transit.

The Brenner line is in strong competition with that of the St. Gothard. As a result, an attempt is being made to considerably shorten the time required between Italy and Germany. In this connection, a step forward has been made with the introduction of the common charging of consignments at Innsbruck, and with the express freight train G 10, where charging is carried out on the train during the journey. Although the commercial speed of transit trains has increased from 13 m.p.h. in 1958 to 28 m.p.h. in 1959, it still remains to reduce frontier and customs formalities which handicap the speeding up of traffic.

FRANCE

Luggage Lockers

The success of the 500 automatic luggage lockers installed by the S.N.C.F. in 12 stations in 1957 resulted in orders for 2,500 more, which are being introduced in some 100 additional stations. The new lockers include a device for automatic collection of the hire charge for a second period of 24 hr. Experience has shown that occupation of a locker seldom exceeds 48 hr.

Paris "Transit Cloakroom Service."

The "transit cloakroom service" for hand baggage between the Gare de Lyon or the Gare d'Austerlitz and Gare du Nord in Paris, introduced in March, has been extended to the Gare de l'Est.

Publications Received

Welding Handbook. Fourth Edition. Section Three: Special Welding Processes and Cutting. Edited by Arthur L. Phillips. American Welding Society. London: Cleaver - Hume Press Limited, 31, Wright's Lane, Kensington, W.8. 9¼ in. x 6¼ in. 480 pp. Illustrated. Price 72s.—The material in this section has been obtained from experts in each particular field irrespective of country and includes the fullest references to original sources. New chapters cover the welding of plastics, adhesive bonding of metals, ultrasonic welding, and welding by cold working. Others deal individually with forge, thermit, and induction welding, surfacing, metal and ceramic spraying, brazing, soldering, oxygen cutting and auxiliary processes, arc cutting, and stud welding. Most chapters begin with fundamental principles, followed by concise instruction in the techniques needed for practical application. There are many diagrams and other illustrations which include products in various stages of fabrication or repair and some of the equipment available for the processes described. Good use is made of tables for the presentation of technical data and the work is well indexed.

Signalling Installations for British Railways, Part 2.—This well-produced and illustrated booklet gives details of three signalling schemes carried out by the Siemens & General Electric Railway Signal Co. Ltd., in the North Eastern, Eastern, and Southern Regions respectively, under the general direction of the Regional Signal Engineers. In the North Eastern Region, the scheme at Huddersfield, which was brought into operation on November 30, 1958, is described with a diagram showing the general layout. The scheme described in the Eastern Region is that on the Colchester-Clacton-Walton lines. The contract, awarded in 1957, was the first placed by British Railways for signalling on lines to be worked on the high-voltage a.c. system. The installation was designed so that all equipment would have adequate immunity from the inductive or other effects of the 50-cycle traction current. In the Southern Region the resignalling of the line from Farningham Road to Sittingbourne and the branch to Sheerness is described. This scheme was carried out in connection with Phase 1 of the extension of electrification to the Kent Coast.

British Transport Film Library Catalogue.—Particulars of films and filmstrips available for free loan from British Transport Films are given in a 75-page illustrated catalogue obtainable from British Transport Films, 25, Savile Row, London, W.1, price 2s. 6d. The many instructional films for railway staff are classified under subjects such as civil engineering, electric traction, motive power, signalling, and stores. They are not only useful to railwaymen from the professional aspect, but also valuable indications of technical progress and practice on British Railways. The subjects of film strips include first aid. In addition there is a wide range of railway, travel, and other films and film-strips of wider interest. The films are available for loan in 16-mm., and most of them in 35-mm., size.

Holidays Overseas.—Evidence of the travel freedom now available to residents in the United Kingdom is given in the greatly enlarged programme of Thos. Cook & Son Ltd., which details suggestions for holidays in every continent outside of Europe. They range from a fortnight in the Canary Islands at 87 guineas, to a 16-week tour of Australia at 925 guineas. Railway travel is included in Canada, the U.S.A., Chile, South Africa, Egypt, India, Japan, and New Zealand.

Pullman Diesel Express Services.—A 20-page brochure produced by British Railways, Western Region, and the Pullman Car Co. Ltd. includes a comprehensive description of the eight-car diesel-electric luxury trains shortly to begin operating the "Bristol Pullman" and "Birmingham Pullman" services to and from Paddington, of which details were given in last week's issue. In addition there are notes on the routes followed by each train and places of interest to be seen, a brief history of the origin and development of the Pullman Car Co., Ltd., since 1859, a specimen *à la carte* menu, wine list, details of railway fares and Pullman supplements, and provisional timetables. Illustrations are in colour; they depict the exterior of the train and the interiors of first and second class saloons. There is also a simplified diagram of the routes.

The Application of Rubber to Railway Uses

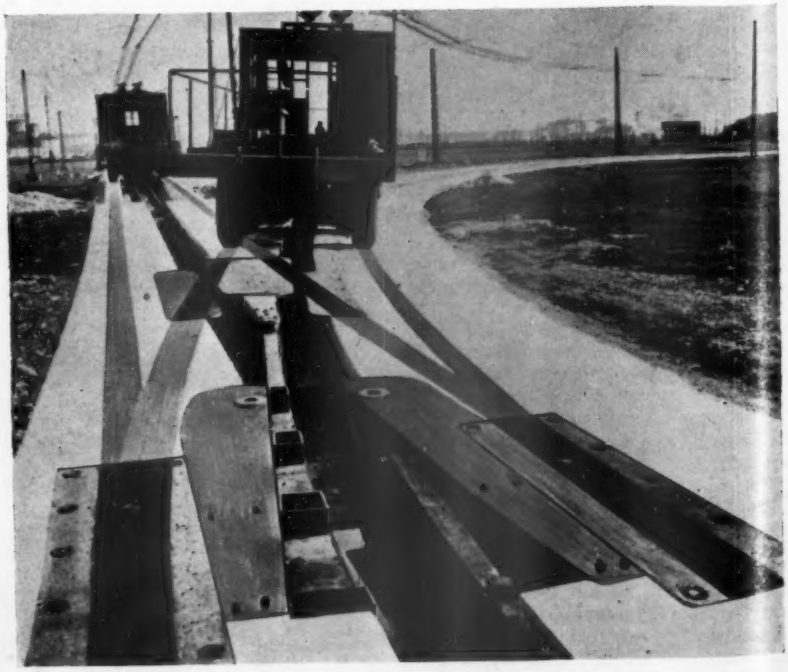
A survey of some aspects of railway developments dependent on the extensive use of this material

Prototype coach with rubber tyres designed for use on Milan underground railway

AN increasing number of applications is being found for the use of rubber on railways. In 1957 a service of pneumatic-tyre trains was inaugurated on the Paris Métro between Châtelet and Mairie des Lilas. The modified bogies developed for use on this line, which were described in an article in our February 15, 1957, issue, are based on a four-wheel centre-pivot bogie unit. Each wheel has pneumatic tyres running on a road-type surface. The steering device consists of four horizontal pneumatic-tyre wheels attached at each corner of the bogie unit some 8 in. above the running surface. These project slightly outside the vertical running wheels and press against the inner faces of low side walls, thus guiding the bogie along the track and round the curves. The disadvantage of this system is that the conventional flanged steel railway wheels must be incorporated in the bogie, closely adjacent to the inner sides of the pneumatic-tyre wheels, to enable points and cross-overs to be negotiated.

Proposals for Milan Underground

This difficulty has been obviated in a new system, designed for possible use in the Milan underground now nearing completion, which has been evolved by Ing. Raffaello Maestrelli. The coaches run on normal heavy-duty wheels and tyres on narrow wheel tracks between which there is a shallow trench or "guide-groove." Rubber-faced guide rails are attached to both sides of this trench. The guide mechanism runs between the guide rails. It consists of units of four steel rollers mounted vertically in pairs, each of which is fixed by a vertical pin to a framework which is attached by a central pivot to the underside of the axle. In principle, the steer-



"Guide-groove" points system on test by Breda Ferroviaria S.p.A.

ing layout is similar to that of a road vehicle except that the guide rollers replace the steering wheel. As each pair of wheels has its own guiding mechanism each wheel follows precisely the same course as the wheel ahead. Moreover, the steering system functions equally well in either direction and the train can negotiate unusually sharp turns.

Rubber Rail Pads and Maintenance

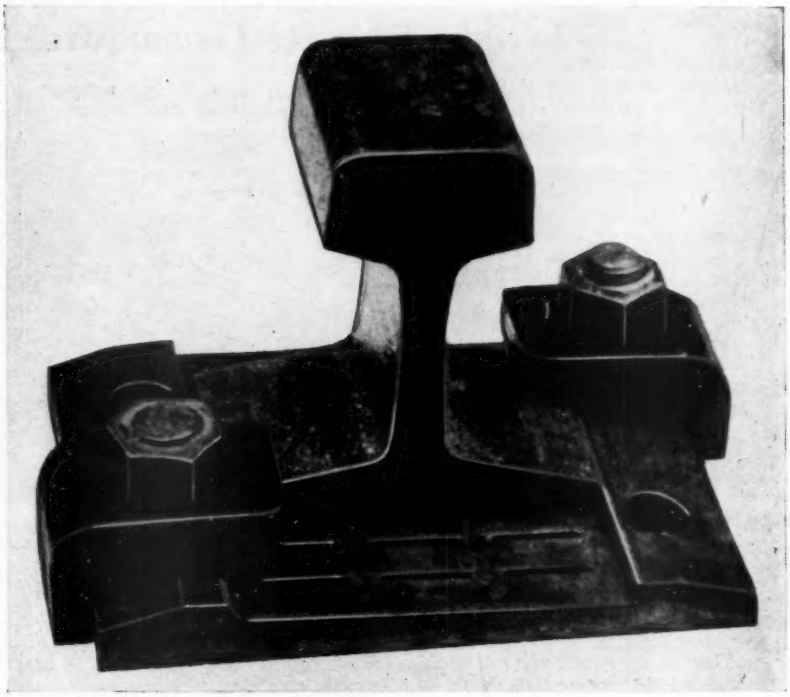
Perhaps the least obvious contribution which rubber is making to railway development is the use of rail pads to cut track maintenance and replacement costs. The basic maintenance problem is caused by the considerable stresses which are applied to the bolts or clips which hold the rail to the sleeper and the tendency for the rails to be lifted before and after the passing of each wheel.

The "progression wave" which precedes and follows the wheels at each sleeper causes the rail to bear down, lift, and then bear down again in a repetitive cycle. When a train is travelling at 60 m.p.h. any one axle will pass from sleeper to sleeper in about one-thirty-fifth of a second, bringing a very rapid reversal of stresses. The holding-down bolts or clips are eventually loosened, and, without proper maintenance, the base of the rail, or the bedplate to which it is attached, lifts off the sleeper as the load approaches and then thuds down as the wheel reaches the point of support. Wooden sleepers are gradually dented into deep grooves where the rail or plate strikes, and concrete sleepers suffer from spalling which eventually results in breakage.

Rubber rail pads used in conjunction with spring clips largely solve the problem. The life of a timber sleeper can be prolonged considerably by this method. With concrete sleepers a rail pad is indispensable.

Complementary Action

Basically, the principles on which the many varieties of rail clip and rail pad function are the same. Clips and pads work together as a unit. As the wheel comes directly over the sleeper the rail pad cushions the shock, then, as the wheel moves forward and rail is deflected upwards, the rubber pad expands vertically while the spring clip exerts increased pressure downwards on the flange of the rail. This action results in a smooth cushioned upward movement during which the rail is tightly held relative to the sleeper.



Rail pad used in the Tokyo Underground Railway on straight section of track

In rail pad design the type of spring clip to be used has to be taken into consideration. The pad has to support the static weight of the rail, the pressure exerted by the clip, and the shock-loading of fast moving rolling-stock, while pad and clip together must maintain a firm grip to prevent longitudinal movement caused by thermal contraction and expansion, despite the vertical movements created by the progression wave and vibrations set up by irregularities in wheel or rail surfaces. Because separation between the rail, pad, and sleeper must be avoided, the natural vibration frequency of both pad and clip has to be much higher than that of the rail. Moreover the clip must be stiff in comparison with the pad to allow the pad to follow upward movement.

Reduction of Noise

Apart from the obvious advantages gained in terms of maintenance and replacements, a further point in favour of the rubber pad is that it considerably reduces noise. This is particularly important on underground city systems. In Tokyo experiments have proved that the reduction of noise resulting from the use of rubber pads is in the region of 6–10 phons in houses in the vicinity of the line. During experimentation pads varying in Shore hardness from 70–90 deg. were tried, and the most satisfactory noise-reduction results were obtained from the softer pads.

Deterioration

Under average conditions rubber rail pads may be expected to last as long as the rails which they support. Exceptions to this generalisation are provided in cases where pads have been laid on heavily-creosoted timber sleepers, at points where oil is spilled from diesel locomotives, and on curves where lubricants are used to reduce wear between wheel flange and rail.

This account is based on two articles by Mr. A. R. Smee, M.I.C.E. Engineering & Road Consultant to the Natural Rubber Development Board. They were published in *Rubber Developments*, which is the organ of the Natural Rubber Development Board.

LONDON MIDLAND REGION STATION CLOSINGS.—The following stations in the London Midland Region, British Railways, are to be closed from September 16: Brandon & Wolston, between Coventry and Rugby, for passengers and parcels; Doe Hill, between Trent Junction and Clay Cross, for all traffic except at the National Coal Board private siding; Aber, between Llandudno Junction and Bangor, for passengers and parcels; Port Dinorwic, between Bangor Caernarvon, for passengers, parcels and some goods traffic; Hoghton, between Preston and Blackburn, for passengers and parcels; Arkholme Borwick, and Melling Goods, on the Carnforth to Wennington line, for all traffic. Bus services operate in the areas concerned and arrangements have been made for handling parcels and goods traffic, where necessary, at neighbouring stations.

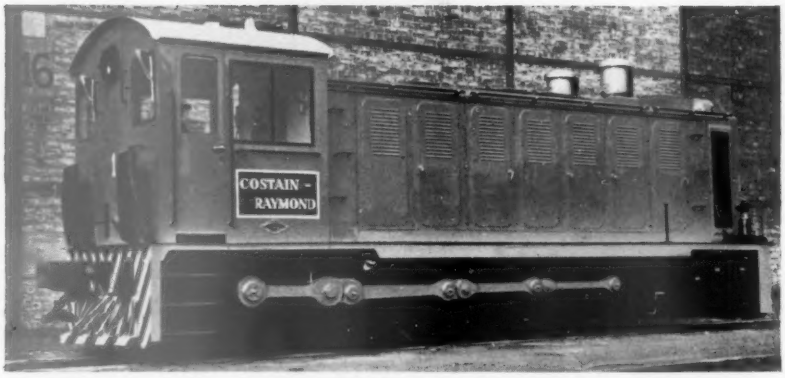
SHUNTING ECONOMY.—Some figures taken out recently for a small 50-h.p. diesel-mechanical loco-tractor in Yorkshire, built by Ruston & Hornsby for industrial service, showed a saving of £20 a week compared with the replaced steam power, of which £14 was on fuel consumption alone and another £1 in fuel handling and watering costs.

CLOSURE OF HEADINGLEY FREIGHT DEPOT.—The Transport Users' Consultative Committee for the Yorkshire Area has agreed that Headingley Freight Depot must be closed to effect immediate economies in the public interest. Facilities for coal traffic will be retained. British Railways, North Eastern Region, has announced that the closure will take effect on Monday, October 10.

PUBLIC TRANSPORT ASSOCIATION DINNER.—The Public Transport Association will hold its annual dinner at the Connaught Rooms, Great Queen Street, London, W.C.2, on November 10 at 6.45 for 7.15 p.m.

Freight Transfer Locomotives for Nigeria

Diesel-hydraulic design for industrial project



Heavy 3-ft. 6-in. gauge four-axle diesel hydraulic shunting locomotive for Nigeria

TWO four-axle rigid frame diesel-hydraulic locomotives have recently been supplied by the North British Locomotive Co. Ltd., to the Westminster Plant Company for rock and ore haulage in Nigeria, in connection with the Escravos Bar contract, a project which is being carried out by Richard Costain Limited and Raymond International Limited. The 20-mile haul from the plant site, which is 600 ft. above sea level, to the River Niger, involves a ruling gradient of 1 in 60. The normal loaded train weight is about 530 tons; and the top designed track speed of 25 m.p.h. suits the permanent way and the provisional schedule, and also enables the continuous rated tractive effort to be high at a low track speed.

The diesel power unit is a 12-cylinder Davey Paxman engine driving a Voith-North British hydraulic transmission. Leading particulars are as follow :

Type	D (or four-axle)
Gauge	3 ft. 6 in.
Length over buffer beams	28 ft. 5½ in.
Maximum height	11 ft. 7 in.
Maximum width	8 ft. 6 in.
Rigid wheelbase	12 ft. 1½ in..
Wheel dia.	3 ft. 3 in.
Radius of minimum curve	200 ft.
Maximum axle load	13 tons
Weight in working order	52 tons
Maximum speed	25 m.p.h.
Starting tractive effort at 27½ per cent adhesion	32,000 lb.
Fuel capacity	490 gal.

Driving Controls

Cab controls are duplicated to provide either side drive; but the cab arrangement and proportions are such that clear driving in either direction can be accomplished without moving from the seats. The control equipment is housed in a steel desk in the centre, with a horizontal control connecting rod extending through the top. Each driving seat is hinged to the cab wall, forward of the two inwards-hinging cab doors. Sliding windows are fitted alongside each seat and a full drop window in each door. Adequate driving visibility is afforded by the large front and rear windows, each of which is fitted with a Trico-Folberth pneumatically-operated screen wiper.

On the driving instrument panel at the front of the cab are fitted the air and vacuum gauges, fuel-tank gauge, speedometer, tachometer, ammeter, and fault-warning lamps. The handbrake wheel and certain other items of equipment are fitted on the rear bulkhead. The cab roof is insulated by a timber lining and an air space between the inner and outer skin. Cab ventilation is by an electrically-driven fan.

Transmission

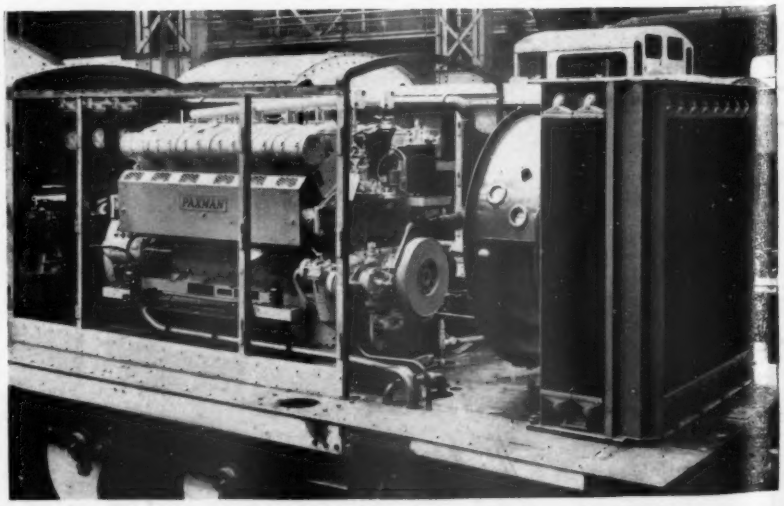
The particular type of North British-Voith transmission installed, the L.217, comprises two torque converters and an hydraulic coupling, one converter being for starting and low-speed work, the second for medium speeds, and the hydraulic coupling to give a cushioned direct drive from 19 m.p.h. upwards. The engine cannot be stalled and the torque ratio changes are made automatically at the correct speed for optimum engine and transmission performance. Driving of the locomotive is thus reduced to operation of the single traction handwheel (which covers the throttle and transmission) and the brake levers.

Following normal Voith practice, the two torque-converter impellers and the fluid coupling impeller are mounted on a common shaft which is gear-driven at a step-up in engine speed. The driven member of each hydraulic unit is coupled by constant-mesh gears to a common output shaft. Piston valves control the filling and emptying of each hydraulic circuit and these valves are in turn controlled by a director valve actuated by a flyweight governor. This governor is driven from the output side of the transmission at a speed which is directly proportional to the road speed. The governor is spring-loaded and this load is varied by air pressure under the control of the throttle lever. The vehicle speed at which transmission gear-changes are made is thus related to both vehicle speed and engine throttle position. Under normal full-load conditions the change from the first converter to the second occurs at about 9½ m.p.h. and from the second converter to the fluid coupling for direct drive at about 18½ m.p.h. To prevent the maximum speed of 25 m.p.h. being exceeded on down gradients an automatic control is fitted which in the event of overspeeding reduces the oil engine speed to idling and applies the brakes.

Final-Drive Unit

Mounted on a jackshaft, the final-drive unit incorporates the reverse-reduction gears, fitted with pneumatic operation of the forward and reverse selectors. The torque-converter casing and final-drive unit casing are bolted together to form an integral unit. Cranks on the jackshaft, which is mounted on self-aligning roller bearings, drive the coupled wheels through forged steel side rods.

The diesel engine has a site rating of 532 b.h.p. at 1,500 r.p.m. It is of Paxman's model 12RPHL mk IV, and is a 60-deg. V engine of 7 in. bore and 7¾ in. stroke, having a cast-iron crankcase and under-



Paxman power plant and Marston/Voith cooling group

slung crankshaft, the bearings of which are tied to the crankcase horizontally as well as vertically. The crankshaft is in oil-hardened steel and carried in steel-backed copper lead bearings. Induction air is drawn through two large heavy-duty Air-Maze oil-bath filters mounted externally on the bonnet top. Lubricating oil priming is by a motor-driven Mirrlees pump.

Control of engine speed and power output is transmitted from the driving cab to the fuel pumps by a Westinghouse air actuator. Idling and maximum speed is controlled by an Ardleigh governor. The engine protection equipment fitted includes a centrifugal-type overspeed trip, and cut-outs for low oil pressure, high water temperature, and low water level. A pressure switch prevents movement of the locomotive until the correct air pressure is available for operation of the controls and the brakes. The main fuel tank is in the upper part of the bonnet at the rear end, and is of 345 gal. capacity, but there is also an auxiliary tank of 135 gal. between the frames behind the front drag-box.

Cooling Equipment

The engine cooling unit at the front end incorporates three banks of radiator elements and a variable-speed fan. The Marston radiator is made up of eight elements at the front and two elements at each side. The header tank projects through the bonnet roof above the horizontal-shaft fan. Air is drawn through the radiator by a 44-in. dia. axial-flow fan and discharged upwards through the roof. The cooling fan is driven by a cardan shaft from the engine, through V belts and a Voith scoop-controlled coupling, the driven element of which is integral with the fan. The coupling impeller is driven by multi-V belts from the front end of the crankshaft. Variation in fan speed is effected by varying the amount of fluid, and hence the degree of slip, in the working circuit of the coupling.

The scoop position which determines the amount of slip is thermostatically controlled according to the engine coolant temperature. Fan power losses are thus eliminated when the engine is cold, and the coolant rapidly reaches an efficient operating temperature. Cooling of the torque-converter oil and the engine lubricating oil is by heat-exchangers incorporated in the main coolant circuit.

Mechanical Portion

The complete superstructure is made up of mild steel plate carried on a steel plate frame. The bonnet top is fitted with a large cover over the engine for access during top overhaul, and the bonnet sides are a series of louvred hinged covers, which are also readily removable for equipment inspection or maintenance. A platform extends forward from the cab at each side, with handrails attached to the bonnet. A 20-ton jack is carried on each platform and re-railing ramps are stowed on the back of the cab. Mounted at each end of the locomotive is a Stone's Tonum headlight and a tail-light. Two lights are provided in the engine compartment and one in the cab. Two Desilux pneuphonic horns are fitted on the cab roof.

Mild steel frame plates 1¼ in. thick are riveted to the cross-stretchers and dragboxes to form a rigid frame assembly. Cowcatchers and A.B.C. Nigerian Railway standard centre-buffer couplings are attached to the front and rear buffer beams. Manganese steel liners are fitted on the wearing surfaces of the Timken roller bearing axle-boxes and on the axle-box guides. Springing is by overhung laminated steel springs. These are anchored to fixed links and compensated in pairs. The axles are pressed into the cast-steel wheel centres, which are fitted with shrunk-on rolled steel tyres. Compressed-air operated sanding is provided at the leading wheels for sanding in either direction of travel.

Wheel-flange lubricators are fitted at the front and rear wheels; these are of Davies & Metcalfe automatic pendulum type, in which the delivery of lubricant to the wheel flanges is increased on the curves and reduced on the straight.

The Westinghouse brake equipment is arranged for straight air braking of the locomotive and vacuum braking of the train. The air brakes are supplied by a Broom & Wade two-cylinder compressor and the vacuum brakes by a Westinghouse four-cylinder exhauster; both machines are belt-driven from the transmission input shaft. Single brake shoes are fitted to each wheel, and the two brake cylinders are mounted outside the frame, below the cab. The 24-V. D.P. Kathenode battery type RKA438 is housed in two battery boxes mounted on the frame below the radiator.

Sub-contractors include the following:

Engine	Davey, Paxman & Co. Ltd.
Radiator	Marston Excelsior Limited
Brake equipment ...	Westinghouse Brake & Signal Co. Ltd.
Brake compressor ...	Broom & Wade Limited
Buffing & drawgear ...	A.B.C. Coupler & Engineering Co. Ltd.
Wheels and axles ...	English Steel Castings Corporation Limited Carntyne Steel Castings Limited
Axleboxes	British Timken Division of the Timken Roller Bearing Company
Springs	J. Spencer & Co. Ltd.
Cardan shafts	Hardy Spicer Limited Laycock Engineering Limited
Windows	Beckett, Laycock & Watkinson Limited City Glass Co. Ltd.
Oil priming pumps ...	Mirrlees (Engineers) Limited British Steam Specialities Limited
Warning horns ...	Desilux Electrical Equipment Limited
Screen wipers	Trico Folberth Limited
Lighting	J. Stone & Co. (Deptford) Ltd. B.M.A.C. Limited
Cab instruments ...	Smiths Industrial Instruments Limited Elliott Bros. (London) Ltd.
Battery	D.P. Battery Co. Ltd.

FIRST MNYUSI-RUVU CONTRACT AWARDED BY EAST AFRICAN RAILWAYS.—As recorded this week in our Contracts and Tenders columns a contract worth about £228,000 has been awarded by East African Railways & Harbours to Stirling-Astaldi (East Africa) Limited for work on a 30-mile section of the Mnyusi-Ruvu rail link at the northern end. This is the first contract to be awarded for work on the 123-mile new line which will link the Tanganyika Central Line and the Tanga Line. The work, which is principally construction of culverts and earthworks, is planned to start on September 1, and to be completed on July 31, 1961. Stirling-Astaldi will be responsible for clearing the line, the excavation of earth in cuttings and its deposition in embankments, the provision of surface water drainage, and the construction of culverts with concrete or corrugated steel pipes. The work starts about 2½ miles east of Mnyusi Station on the existing Tanga Line and finishes 31¼ miles to the south. A further contract for a 10-mile section at the Ruvu end is expected to be awarded next month so that work can begin in October. The whole rail link, which will cost £2,600,000 is planned to be in operation by mid-1962. The joining of the Central and Tanga lines means that, with the exception of the Southern Province Railway in Tanganyika, the whole East African Railway will be a complete unit. This will enable the free movement of wagons throughout Kenya, Tanganyika, and Uganda, to cope with the seasonal rushes of agricultural produce movements which occur at different times in the three countries.

EXAMINATION OF L.T.E. POWER RECEPTACLE BOXES.—London Transport Executive has laid down that if there is any suspicion of any damage to any power receptacle box in an Underground train, the car concerned is to be stopped immediately, regardless of whether this necessitates cancelling the train. This rule has been introduced since a Central Line underground train caught fire in a tunnel near Redbridge Station, Ilford, on August 11. At the Ministry of Transport inquiry, conducted by Colonel D. McMullen, it was reported that 11 of the 38 people overcome by smoke were still in hospital. Mr. A. W. Manser, Chief Mechanical Engineer (Railways), London Transport Executive, stated that an electrical fault originated in the leading power receptacle box insulation compartment. The subsequent fusing burnt away the inside of the box, conduits and cables, and also burnt a hole in the reservoir pipe. This fusing would account for the dense fumes in the train. The fusing stopped only after the driver switched off the traction current. Mr. Manser added that a contributing factor to the fault might have been the rain on Wednesday and Thursday morning of that week. After a similar accident at Holland Park two years ago various modifications had been made to the receptacle box. Since the latest accident a check had been made on all receptacle boxes. This increased incidence of trouble with these boxes, he believed, arose from the increased tendency to get fusing with overhead leads improperly fitted. All the boxes should be out of service by 1963. Adjourning the inquiry until August 25, Colonel McMullen said that he intended inspecting the method of repairing and maintaining the receptacle boxes used on the Central Line tube trains before the resumed hearing.

FURTHER DAMAGE BY CHILDREN.—Train services on the Crewe to Manchester electrified line of the London Midland Region, British Railways, were suspended for an hour on August 22 when the a.c. overhead equipment was damaged by stones thrown by children. The window of the cab of an electric locomotive, in which a driver was undergoing training, was broken, and a trailing contact wire caused a flashover when it was struck by the locomotive. The train crew did not suffer any injury.

Swiss Flat and Drop-Side Wagons

Special designs with low sides for motorcar and other traffics

Two-power electric-diesel locomotive with light-alloy sided flat wagon, Berne-Loetschberg-Simplon Railway

FOR its extensive motorcar traffic over the St. Gotthard line, the Swiss Federal Railways has in service 100 or so flat wagons built new or converted. These two-axle vehicles have a wheelbase of 8 m. (26 ft. 3 in.), a length between headstocks of 12·58 m. (41 ft. 1 in.), and a useful surface area of 36·2 sq. m. (388 sq. ft.). Height of the floor above rails is 1·34 m. (52·7 in.).

Eight Drop Sections

Maximum pay-load is considered to be 28 tons and empty weight is 10 tons. Low sides extend between the headstocks, and each side has been made in eight drop sections of Al-Mg-Si light alloy, each section of the side weighing about 31 kg. (67 lb.).

This material has been used not to gain some economy in wagon weight, for all the rest of the vehicle is in steel, but for ease in handling. The sections can be raised and lowered individually or in groups of two or three. Each section is 1,594 mm. long by 405 mm. high (63 in. by 16 in.) and is of special strutted hollow cross-section, as shown in the accompanying sketch, with an overall width of 65 mm. (2·6 in.).

Transport of Motorcars

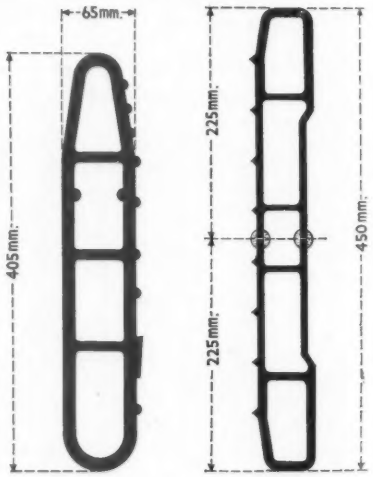
Similar wagons are used also by the Berne–Loetschberg–Simplon Railway for the motorcar transport service between Kandersteg and Brigue, and, with the S.B.B., from Brigue through the Simplon Tunnel to Iselle. One of these light alloy wagons is shown in the illustration.

The train depicted is hauled by one of the new two-power electric-diesel locomotives of 340/200 b.h.p., built by the Swiss Locomotive & Machine Works and powered by one of the air-cooled diesel engines constructed by that company.

General Purpose Wagons

The S.B.B. also has at work or under construction 260 drop-side flat wagons for general purposes, in which the same principles have been applied to the light-alloy sides, though here the height is 450 mm. (17·75 in.) and the internal stiffening is arranged differently, as may be seen in the second of the diagrams on this page.

Tare in this case is 11·7 tons, useful surface area 35 sq. m. (376 sq. ft.), wheelbase 8 m. and pay-load 28 tons.



Sections through flat (left) and drop-side (right) wagons sides

Goods Working in New Zealand

Heavy goods train to Auckland passing Westfield Junction, New Zealand Government Railways, showing (left) part of reclamation for new marshalling yard

ELECTRIC RAILWAY TRACTION SECTION

Voltages for A.C. Electrification

CONTROVERSY over the merits of different systems and voltages is as old as the history of electric traction. The most that can be said at the present time is that there is wider agreement than before on the potentialities of a.c. electrification; but there is still much argument as to the circumstances in which those potentialities are likely to be realised to the best advantage. Another topic for discussion has now arisen concerning the choice of voltage for an a.c. electrification system in the light of safety for railway staff and members of the public.

Correspondence in *The Guardian* recently included a letter suggesting that 10 kV., or even 6·6 kV., might have been adopted generally for British Railways without loss of technical advantage. Pointing to the fact that locomotives and motor coaches are being built for operation on 25 kV. or 6·6 kV., this correspondent maintained that it was not too late now to change to the lower voltage for all purposes instead of confining it to areas where clearance difficulties exist. In some circumstances the adoption of a lower standard voltage might have been considered, but hardly at a time when the economics of an electrification system are at least as important as its technical aspects.

Presumably the choice of 25 kV. a.c. was made after the most careful analysis of the capital savings to be obtained from a lighter overhead system and widely-spaced feeder points, and after balancing these factors against the problems imposed by using an industrial-frequency supply at any voltage. At 6·6 kV. there is the same need to overhaul the signalling system and track circuits for immunity from interference, to take special care of telecommunications circuits for the same reason, and possibly to provide booster transformers and feeders for the return traction current. These factors and the necessary provision at fairly short intervals of overhead switchgear for sectionalising all count against the basic simplicity and economy of an a.c. scheme, and if the fundamental advantage of the light catenary is not to be exploited to the full it would surely be harder to justify the a.c. system. Development in d.c. traction is not standing still while railwaymen are immersed in their a.c. problems.

Furthermore, on economic grounds again, the development of practical 25-kV. equipment for export is essential to this country and in many potential export markets traffic and site conditions are likely to be such that the high voltage can be used to better advantage than here. For this reason, too, it is essential for practical experience to be gained by the British electrical industry in all problems associated with the safe and efficient utilisation of a 25-kV. overhead supply. It has already been shown by the recent British Railways demonstration at Colchester that the unquestioned dangers of a high-voltage system can be guarded against by the combination of wise technical planning and suitable education of the staff and public.

On that occasion, Brigadier C. A. Langley, Chief Inspecting Officer of Railways, Ministry of Transport, stated that the demonstration had illustrated most effectively three important facts. First, the clearances between the contact wire and a structure, whether moving or fixed, as laid down by the B.T.C. and authorised by the Minister provided an ample margin of safety. Secondly, there would be no danger to anyone legitimately on or in contact with a locomotive, if by any remote chance there was a flashover from the overhead wire even if there was a high voltage surge such as might occur during an electric storm. Thirdly, the results of failure to obey the safety rules had been vividly emphasised when the dummy used in the experiments had been brought close to the contact wire and flashover occurred.

The experience of the French National Railways affords evidence that the use of such high voltages brings with it little difficulty in the maintenance of safety. In some respects the a.c. system is safer than other overhead systems. The comparative freedom of the a.c. system from voltage surges renders failures of insulation less likely. In the event of faults, or accidents giving rise to short circuits, the extent of arcing and burning of insulation, and the risk of fire is minimised because of the low value of fault currents, and because of the ease of detection and clearance of faults by opening of circuit breakers at the sub-stations.

Lille-Basle Line Operations

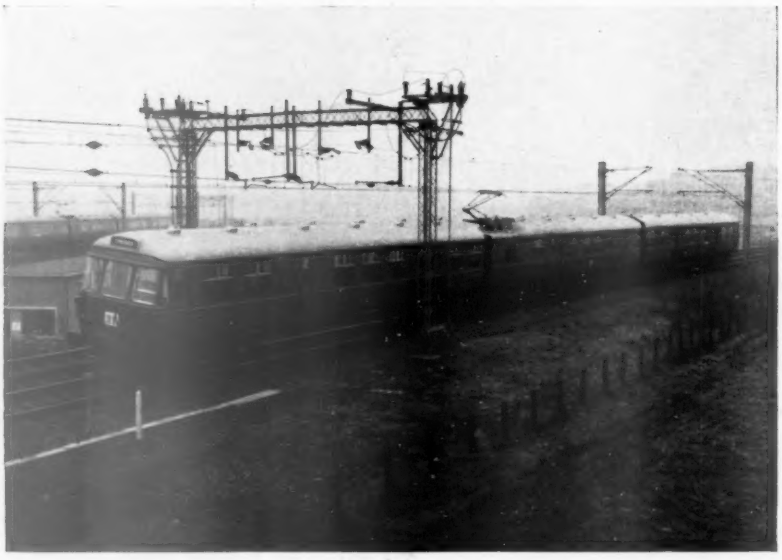
IT is five years this summer since the formal opening of the French National Railways 50-cycle electrification from Valenciennes to Thionville, which took place on June 29, 1955. At that time the heavy coal and mineral traffic between Northern France and Lorraine was the principal justification for the scheme, but as it was extended towards the South-East its character changed. The link from Thionville to Luxembourg has brought passenger traffic from Belgium and Holland; at Sarrebourg connection is made with the main line from Paris to Strasbourg *via* Nancy ; while from Mulhouse over the last 21 miles to Basle the route is shared by trains from Paris, *via* Chaumont, to Switzerland and beyond. West of Thionville, also, the situation has changed with the years, for whereas in 1953 an article in a French technical publication on the prospects for the Valenciennes–Thionville line spoke of decreased international passenger traffic compared with 1938 as a result of currency restrictions, today the Calais–Basle trains may load up to 1,000 tons at holiday week-ends.

There have also been developments in motive power. Strasbourg depot, we learned on a recent visit, now has 26 Bo-Bo locomotives of the " 16,000 " class and 32 of the " 16,500 " class, as well as 48 of the " 13,000 " class with a.c. motors which were among the original designs for the line. There is a tendency today to regard the 50-cycle a.c. locomotive with series commutator motors as obsolescent, but it must be recorded that it is active and numerous on the Lille–Basle line, and that on the occasion of our visit a locomotive of this type was working the Dunkirk–Basle trains in both directions between Lille and Thionville. The single-phase-three-phase converter locomotives are now on the Paris–Lille line, but the a.c./d.c. series is in evidence on the western half of the route.

Since early this year electric locomotives based on Strasbourg have worked all traffic to and from Blainville on the Paris line *via* Sarrebourg. Some of the principal passenger workings from this depot are between Luxembourg and Basle, and between these trips time may be filled in with one or two return journeys over the Basle–Mulhouse section with trains to and from Paris *via* Chaumont. The four prototype dual-frequency Bo-Bo locomotives are shedded at Strasbourg, including No. 20103 with its Schneider–Westinghouse silicon rectifier equipment (see our July 29 issue). This locomotive works on the same duties as one of the " 16,000 " class with ignitron rectifiers, including the haulage in both directions between Luxembourg and Basle of the Brussels – Basle day trains, with which the Dunkirk – Basle trains are combined between Thionville and Basle. At Thionville the Dunkirk–Basle portions reverse their direction. Coming from Basle, for example, they enter the station from the south near the front of the main train bound for Luxembourg and Brussels, are drawn ahead by the train engine, and shunted back into the south-bound platform, where the locomotive which is to haul them to Lille comes on at the other end. There is a further reversal at Mezières–Charleville, where the route through the station continues to Givet. A triangle almost at the platform ends allows goods traffic between Valenciennes and Thionville, or more distant points in each direction, to by-pass the station, while passenger trains on that route which are booked to call can run in and out again, their locomotive changing ends in the station. All these manoeuvres are expeditiously carried out, and the punctuality as far as we had the opportunity to observe, was impeccable, both of the main trains and their connections. At Longuyon, for example, the Basle–Dunkirk service has a stop of 14 min. during which a connecting train from Nancy arrives, transfers through-coaches for Lille, and departs for Longwy. Considering the distances involved, the planning of connections such as this reveals considerable confidence in the reliability of electric traction.

Three-Car Trains for Glasgow Suburban Services

Automatic changeover from 25 kV. to 6·25 kV. 50 cycles a.c. before entry into areas of restricted clearances



Three-car multiple-unit train near Westerton

ATTRACTION of traffic at off-peak periods was one factor borne in mind in design of three-car sets for the Glasgow suburban lines of British Railways, Scottish Region, now in course of electrification at 25 kV., 50 cycles, a.c., with automatic changeover to 6·25 kV. before entry into the tunnel area and running over other sections where overhead clearances are restricted.

In the early stages of the design, the builders, the Pressed Steel Co. Ltd., constructed a full-size mock-up equipped to show alternative seating layouts, cab styling variants, and a choice of fittings, colours, and materials for the interior décor and upholstery. Electrical equipment has been supplied by Associated Electrical Industries Limited.

The design was by the Pressed Steel Co. Ltd. to British Transport Commission requirements, under the general direction of Mr. S. B. Warder and Mr. J. F. Harrison, Chief Electrical Engineer and Chief Mechanical Engineer respectively, British Railways Central Staff, in consultation with Mr. James Ness, General Manager, Scottish Region. The bright blue livery, with black-and-yellow lining, is a revival of that used for locomotives of the former Caledonian Railway.

High Passenger Capacity

The saloon coaches have a maximum width of 9 ft. 3 in. at waist giving a pronounced turnunder. Each trailer car seats 83 passengers, with standing room in the 4-ft. wide vestibules. One non-smoking saloon is provided in each trailer car. The motor car seats 70. The sliding doors are power operated.

Each three-car unit is made up of one driving trailer car, one non-driving motor brake car, and one battery driving trailer car. Two or three units may be coupled to form six- or nine-car trains.

Each coach has an open saloon in the centre and a saloon enclosed by a sliding door at each end. The enclosed saloon seating in the trailer cars face the driving cab; the remainder are facing-seat units. Hinged seats are fitted adjacent to the vestibules to provide maintenance access to the power-operated sliding door gear.

The seat frames are a welded assembly of steel tubing and sheet metal pressings. Seat cushions and squabs are foam rubber filled and covered in moquette. The seat ends, up to the armrests, are covered in black Vynide. On the top of the back rest is a light-alloy grab handle. The seat cushions are reversible and to facilitate cleaning an open area is provided at the back of the cushion. The wide-type saloon windows of toughened glass, rubber glazed in light-alloy frames, are fitted with sliding ventilator units at the top.

The principal dimensions and particulars are as follow:—

	ft. in.
Overall length of three-car set	198 7½
Overall width	9 3
Height to roof panels	12 4½
Bogie centres	46 6
Bogie wheelbase, trailers	8 6
Bogie wheelbase, motorcar	8 9
Wheel diameter, trailers	3 6
Wheel diameter, motorcar	3 4
Tare weights:	
Motor car	55 ton 11½ cwt.
Driving trailer car	33 ton 17½ cwt.
Battery driving trailer car	37 ton 9½ cwt.
Traction motor voltage	975 V.
One-hour rating of motors	220 h.p.
Gear ratio	17 : 70
Maximum speed	75 m.p.h.
Level balancing speed	
full field	63 m.p.h.
weak field	74 m.p.h.

Vestibule partitions in the saloons have been designed with the maximum amount of glazing to give unimpeded vision throughout the saloon. The back of the cab partition is similarly glazed and also the decorative arches above the saloon partitions. Ventilation is by two rows of Air-Vac roof ventilators, the air ducts being concealed by the lighting reflector panel in the ceiling. The full length

Interior of driving trailer

tubular luggage racks in satin finish aluminium are fitted with rubber mountings to eliminate rattle. A reeded aluminium protection plate is fitted at the back of the rack.

Interior Décor

Seat covering in the observation saloons of the trailer cars is in patterned blue and black moquette, the remaining seats being covered in yellow, brown and black moquette. The bodyside panels are Formica faced in decorative Pompadour, with decorative Pantomine grey for the sliding-door partitions. The timber surround of the partitions is polished African walnut.

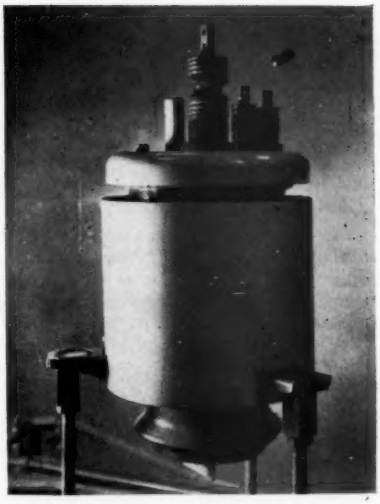
In the motor car the end saloon seats are covered in red and black moquette and the remainder in green and black. The bodyside panels are faced in decorative Pompadour. The hardboard ceilings of all cars are Formica faced in ivory soft glow matt, and the saloon floors covered in gunmetal marble linoleum. In the vestibules the linoleum is pebble grey and in the driving cabs azure blue.

A distinctive feature of this stock is the high standard and evenly diffused artificial lighting, the lighting load in each coach being rated at 1½ kW. In the centre of the ceiling is a row of tapered box-form white glass diffusers, each enclosing a single tungsten bulb. Above the lamps is a full length wide reflector panel. Lighting current is supplied at 110 V., voltage control being by an automatic voltage regulator which incorporates a germanium bridge rectifier. The nickel cadmium battery, made up of 72 cells, has a capacity of 80 Ah.

Coach heating is by finned type heaters installed under the passenger seats. The heaters, which operate at 240 V., are thermostatically controlled. The cab is heated by two tubular heaters. Four similar heaters are fitted in the guards compartment.

Cab Styling and Layout

The appearance of the complete train is considerably enhanced by the cab styling. The cab is made up of a large centre window and two outer windows which curve at the corners to blend with the bodyside. The dividing pillars are narrow and a projecting outside moulding blends the three windows together at the top. Excellent visibility is thus afforded to the drivers and the observation saloon passengers. Above the centre window is the destinations indicator and below the window is a route indicator. Toughened safety glass is used for the cab windows, which are rubber glazed on the outside to facilitate replacement. Trico-Folberth screen wipers are fitted. Toughened-glass drop lights are fitted in the cab access doors; these are hinged outwards.



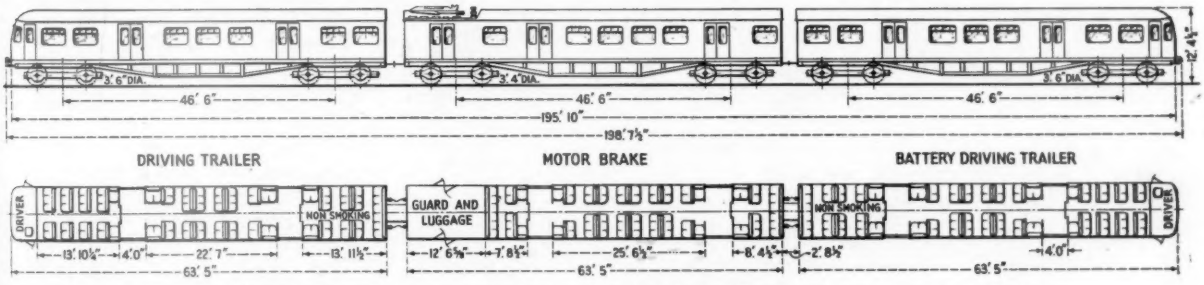
Single-anode mercury-arc rectifier

In the driving compartment is a full width flat top desk, with the driving controls and instruments neatly arranged at the left-hand side. On the right of the knee-hole is the master controller and reverser and on the left the air brake control. Driving instruments and indicators are mounted on a sloping panel. An upholstered tip-up seat, adjustable for height, is provided for the driver; an additional tip-up seat is fitted at the other side of the cab. Placed against the rear partition is an l.t. cubicle, and in front of the tip-up seat is the handbrake wheel. The cab ceiling is flat and above this is housed the A.W.S. equipment.

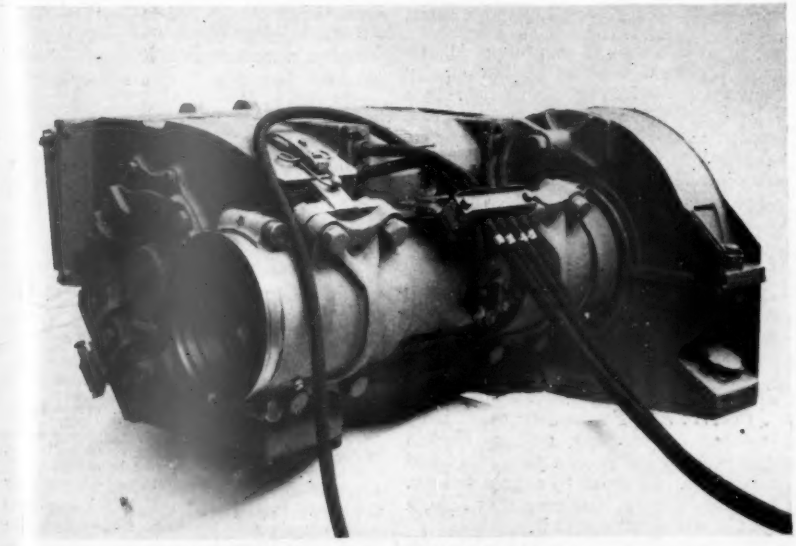
Cab ventilation is obtained through ceiling vents to the space above the ceiling of the adjoining saloon. Up to waist height the cab is finished in dark grey, with light grey between waist and ceiling. Communication between the driver and guard is by Loudaphone.

The guard's compartment equipment includes all normal emergency equipment and an electric oven for crew meals. The swivel seat is a glass-fibre pressing. Bitumen granite composition is used for the floor. Hinged double doors are provided for luggage loading.

The main equipment is installed below floor level in the underframe of the power



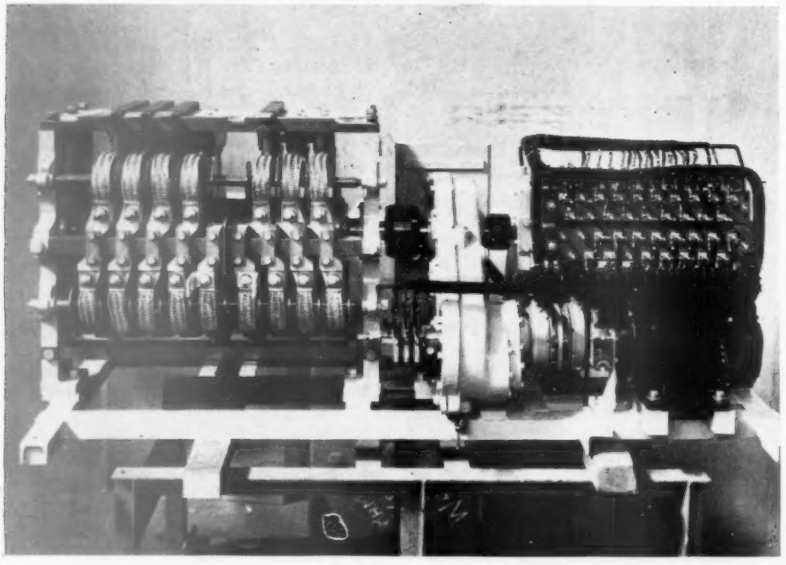
Elevation and plan of two-car unit, showing leading dimensions and arrangement of seating



Self-ventilated nose-suspended traction motor

car; distributed to give an approximately equal wheel loading. In the centre bay is the main transformer and in one outer bay is one twin rectifier unit, motor switchgear, and smoothing choke. On the opposite side of the transformer is the cooling radiator, tap changer, tap changing resistances, twin rectifier unit, and rectifier auxiliaries. Mounted on the roof of the guards compartment is the pantograph, potential measuring device, and air-blast circuit breaker. Also incorporated in the roof gear is an earthing switch which is manually operated from a trap in the compartment roof.

An l.t. equipment cubicle is installed against the guard compartment partition. On the underframe of the battery driving trailer are mounted the two battery containers, automatic voltage regulator, air-brake compressor, compressor rectifier, and an l.t. switchgear cubicle. A battery-powered auxiliary air compressor is used to supply air, in the event of a discharged main reservoir, for the raising of the pantograph and closing of the air-blast circuit-breaker.



Motor-driven off-load tap-changing camshaft

Control Scheme

The voltage applied to the rectifiers from the transformer secondary is varied in 15 steps by means of a motor-driven off-load tap-changing camshaft. Current breaking is carried out by four electro-pneumatic contactors mounted in the same cubicle. The master controller has four positions giving shunting notch, half power, full power, and weak field. Intermediate tap-changer positions are taken under the control of two accelerating relays in the traction motor circuits. Air-cooled transition resistors ensure the continuity of supply during the tap-changing.

Four electro-pneumatic motor contactors are provided, enabling pairs of motors to be isolated if required.

Protection on the primary side of the transformer is by a differential relay, while that on the secondary is by two overload relays and an earth fault relay. These relays are arranged to open the air blast circuit breaker under fault conditions; earthing brushes are fitted on the road wheel axles.

Rectifiers and Transformers

Rectification is by four bridge-connected single-anode mercury-arc rectifiers of the continuously excited type. These are mounted in pairs in two cubicles on the underframe. Cooling is by two motor-driven Keith Blackman fans, each having a delivery of 1,500 c.f.m. Thermostatically controlled preheating to the minimum operating temperature before starting is by applying a low voltage to the rectifier and shorting its output through a resistor. The rectifiers have a continuous rating of 700 kW.

The core type oil-cooled transformer is contained in a tank, a separate compartment of which houses the h.t. supply changeover switch. Oil circulation is by a 50 g.p.m. pump, the oil being cooled in a Serck radiator. The 22-in. diameter radiator fan, is driven by a single-phase induction motor. A tertiary on the transformer supplies current at 240 V. a.c. for auxiliary requirements.

Traction Motors

The traction motors, which are self-ventilated nose-suspended machines, have continuous ratings as follow:

Full field 975 V. 165 A. 190 b.h.p.
Weak field 975 V. 180 A. 210 b.h.p.

The single spur reduction gears have a ratio of 17: 70. Frame suspension is by a rubber bushed link and a Timken roller-bearing suspension sleeve is fitted on the axle. In order to reduce the a.c. ripple through the traction motor field, a shunt is connected across it.

An iron-cored choke is used to smooth the field current to each pair of motors, the choke being cooled by oil circulating through the transformer cooling radiator.

The bodies are of all steel welded construction, using 16g. sheet for the body-side panels and 16g. galvanised sheet for the roof. On the inside the panels are sprayed with bituminous emulsion and a ¾-in. thick layer of Limpet asbestos. On the outside of the timber lining of the coach is a 1-in. thick layer of glass fibre matting, leaving an air space between the inner and outer walls. This construction, which is also used for the roof, provides very effective sound and heat insulation. The corrugated sheet steel floor is 14g. thick and is insulated with a thick layer of Limpet asbestos and covered with Sundeala board. Each coach is fitted with two pairs of air-operated sliding doors in each side, opening into wide vestibules for standing passengers. Fixed lights are fitted in the doors. The G.D. Peters door gear is electrically controlled from the guards compartment.

Underframe Construction

The underframe is a welded assembly of rolled steel sections, reinforced as required in the heavy equipment areas. Automatic couplings are used between the coaches, with vestibule-type buffers employing Ferodo and steel rubbing surfaces. At the outer ends of the train set, drophead couplers and standard spring buffers are fitted.

Bogies are of the wide bearing double bolster pattern. The motor bogies are a welded assembly of plate and rolled steel sections and the trailer bogies a riveted assembly of steel pressings. Ferodo bushes are used at the centre pivots. The roller-bearing axleboxes are the S.K.F. self-aligning type on the trailer cars and Timken bearings on the motor car.

The Westinghouse air brakes are operated by self-lapping electro-pneumatic controls. On the motor car the centrally mounted brake cylinder is 18 in. x 18 in. and on the trailer cars 16 in. x 8 in. and 12 in. x 8 in. Automatic slack adjusters are incorporated and operation is through fully compensated clasp brake rigging.

Sub-contractors include the following:

Compressor and brake equipment	Westinghouse Brake & Signal Co. Ltd.
Compressor rectifier	Standard Telephones & Cables Limited
Auxiliary compressor	Bristol Pneumatic Tools Limited
Transformer oil cooler	Serck Radiators Limited
Transformer oil pump	Pulsometer Engineering Co. Ltd.
Battery	Nife Batteries Limited
Pantograph	J. Stone & Co. (Deptford) Ltd.
Air-blast circuit breaker	Brown Boveri & Co. Ltd.
Lighting and heating jumpers	English Electric Co. Ltd.
Speedometer and mileage recorder	S. Smith & Sons Ltd.
Rectifier cooling fans	Keith Blackman Limited
Windows	Hallam Sleigh & Cheston Limited
Screen wipers	Trico Folberth Limited
Warning horns	Desilux Electrical Equipment Limited
Axleboxes	British Timken Limited
	The Skefko Ball Bearing Co. Ltd.
Sliding door gear	G. D. Peters & Co. Ltd.
Heat and sound insulation	J. W. Roberts Limited
	W. Gilmour Smith & Co. Ltd.
Telephone equipment	Clifford & Snell Limited
Seating upholstery	John Holdsworth & Co. Ltd.
Control jumper connections	General Electric Co. Ltd.
Plastic panels	Formica Limited

Swedish State Railways Multiple-Unit Trains

Triple-car sets for interurban services on single-phase 15-kV. 16·6-cycle system

Swedish State Railways triple-car electric train set, Series Yoa 2

AFTER having used three-car multiple-unit electric trains for some years on certain long-distance fast services, such as Stockholm-Malmö, the Swedish State Railways since the beginning of this year has been introducing gradually a batch of 14 new triple-car trains which, though in regard to seating comfort could be used on long runs, are intended more specifically for shorter-distance interurban journeys, and so they do not include full dining facilities, but do have a small pantry and a refreshment service to the seats. Some of these trains have been allocated to operation between Göteborg and Bergslagen, and between Stockholm and Falun.

Known as series Yoa 2, these trains have been built by Hilding Carlssons Mek. Verkstad, at Umeå, and incorporate Asea electrical equipment, and the train design was evolved by the rolling stock department of the State Railways (SJ) in collaboration with the builders. Normally a train comprises two end motor-coaches, each with a driving cabin at the outer end, and one intermediate trailer, all close-coupled; but the power is sufficient for the formation to be strengthened by a second intermediate trailer if traffic should make this desirable. If desired two motor-coaches can be operated alone, or two train formations can be run in multiple-unit.

Body Construction

Welded steel construction is used for the car bodies and frames, and the exteriors are spray-painted with a special nitreous enamel. The A motor-coach contains a luggage room with 85 sq. ft. of floor area, a pantry, and 24 non-smoking second-class seats; the B motor-coach has 46 smoking second-class seats, a toilet room, and luggage racks. The trailers are of two types: one has 30 first-class seats and a toilet room; the second has 54 non-smoking second-class seats and a toilet room.

Interior panelling is of laminated plastics. All windows are of safety glass, with either hardened or laminated panes; and in the passenger saloons, the double panes are hermetically sealed to prevent any misting. The driving windows are electrically heated. Because of the width of the Swedish loading gauge, the body width is as much as 3·1 m. (10 ft. 2½ in.) outside, and this enables very comfortable seats to be provided in both classes, and with a very wide centre aisle.

In the second-class saloons two rows of seats are placed on either side of this central aisle; but on one side they are facing the front end and on the opposite side they face in the other direction. To provide good travel amenities, there are folding tables, foot-rests, and separate wardrobes. The first-class cars are equipped with modern arm-chair seats with four different seating positions. As there are only three chairs on the cross-section, as against four in the second class, even more space for each seat is available in the first class. For the sake of variety the seat covering has different colours in separate cars. This arrangement is also considered to help the passenger to find his own car if he should take a walk through the train.

The cars are electrically heated, partly with convection heaters and partly with warmed air, the second method being introduced to get ventilation with the pressure inside the car somewhat higher than the outside pressure. Heating regulation is automatic with thermostatic control. Fluorescent tubes provide a general lighting of a high standard in the trains (about 225 lux at the reading level); and there are loudspeakers for messages to the passengers from the driver or the guard. The toilets are equipped with sockets for electric razors.

Between the cars there are insulated communication bellows and an hydraulic stabilising device which reduces the relative lateral and vertical movements of the cars. The mechanical couplings are automatic and of the Runnvika-Scharfenberg type, giving the necessary mechanical electric and pneumatic connections simultaneously. Because of these, and a special design of the communication bellows and the stabilising device, a car can be added to or taken away from the train in a few minutes, whereas in the preceding S.J. multiple-unit electric trains this process has taken much longer.

Electrical Equipment

Somewhat unusual electrical equipment is installed in that there are only two traction motors in a train unit, one on each motorcoach. The motor is carried on the car underframe near the centre, and drives the inner axle of each bogie through long cardan shafts, so that four axles in a train set are driven. Each motor has a one-hr. rating of 230 h.p., so that a triple-car train weighing 63 tons empty has 460 h.p., or 7·2 h.p. per ton of tare, or about 6·2 h.p. per ton of fully-laden weight, these ratios being quite enough for the services being worked, which do not call for frequent rapid accelerations. In regard to the static equipment, the A motor-coach carries the single light-weight pantograph of the train and also the main transformer and principal switch-gear. The B motorcoach contains

an auxiliary set including a generator and an air compressor, and also a transformer for stationary heating of the train from the standard 1,000-volt system.

Following long-standing SJ principles for multiple-unit trains and diesel railcars, these Yoa 2 trains are of lightweight construction in framing, bodies and medium-wheelbase bogies; and also the 676-mm. (26·6-in.) wheels themselves are of the SAB flexible type with 16 rubber elements in each. As a result, the empty weight of an A motor-coach is no more than 26 tons, with a corresponding maximum axle load of 8 tons; a B motor-coach tares 21 tons, with an axle-load of 6·5 tons; and a trailer weighs 16 tons. In fully-laden condition an A motor-coach weighs about 30 tons, a B motor-coach about 25 tons, and a trailer about 21 tons, so that the 63-ton tare of a triple-car set is expanded to about 76 tons, with a maximum axle load of 9½ tons. Top speed in service is limited to 105 km.p.h. (65 m.p.h.) to suit the trains to a variety of Swedish lines which cannot take a really high top speed.

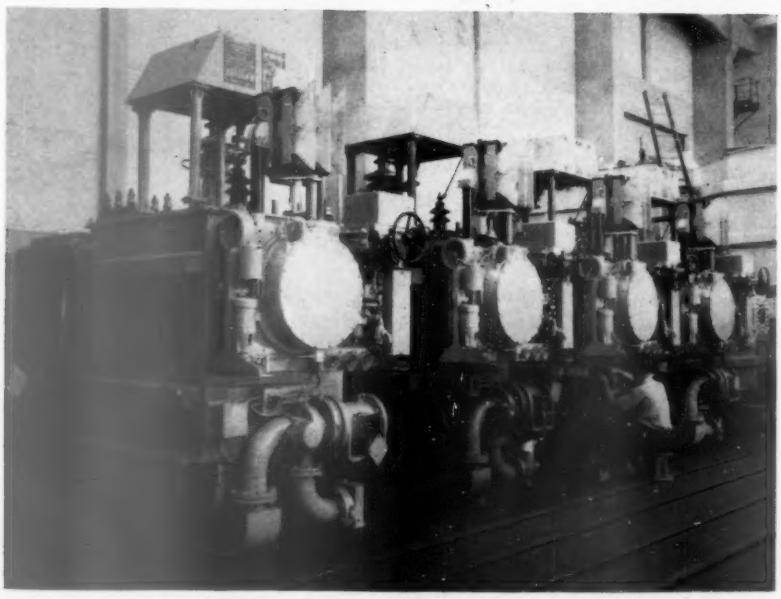
Interior of car, showing individual seats and fluorescent lighting

Rotary Tap-changer for A.C. Locomotives

Equipment for French-built 25-kV. a.c. locomotives being supplied to the U.S.S.R. and Chinese Republic Railways

AFTER the successful performance in the four French National Railways prototype dual-frequency locomotives of the high-tension tap-changer developed by Brown Boveri, similar equipment is being manufactured in France by the Compagnie Electro-Mécanique for the 25-kV. a.c. locomotives being supplied by French industry to the U.S.S.R. and Chinese Republic Railways (see our May 6 issue). The accompanying illustration shows a number of these tap-changers being fitted to Jeumont transformers in readiness for installation in the locomotives.

Their characteristic feature is the drum-shape casing containing the selector mechanism, in which the arrangement of the contacts in two concentric circles of 16 contacts each has enabled a 32-step tap-changer to be provided in a compact form.



Tap-changers, manufactured by Compagnie Electro-Mecanique, being fitted to 25-kV. locomotive transformers at Jeumont Works

The contacts are traversed by two rollers mounted on a rotating arm, which also carries two other rollers riding on continuous tracks connected with the outlet from the tap-changer to the primary of the traction transformer windings. The arm is driven through gearing by an air servo-motor controlled by electro-magnetic valves responsive to the movements of the driver's controller.

Operation of Contactors

A camshaft driven from the servo-motor shaft operates the three contactors seen above each tap-changer. Two of these establish or break the connection from one or other continuous contact track (according to the tapping in use) to the outlet terminal, and the third connects and disconnects the transition resistor. No current is broken by the selector contacts themselves.

During this operation the transition resistor is connected between the two tappings concerned, but is switched out on completion of the tap change. A protective resistance is permanently connected between the two continuous contact tracks.

The selector mechanism operates in a bath of oil which is continuously circulated and filtered by a small electrically driven pump. This supply is independent of the transformer oil, the tap-changer being sealed off from the transformer tank by its insulating backplate.

High-performance Cars for Chicago Transit Authority

New co-operative designs being tested in service

Photo] [C. E. Keevil

Experimental train made up of three high-speed cars each fitted with different designs of bogie

THE Chicago Transit Authority is now testing three high-speed high-performance cars on its rapid transit tracks. They form part of a development programme in which the C.T.A. is co-operating with leading manufacturers in the United States, and are stated to be the first cars of their kind to be built for urban railways. The cars are capable of more than 70 m.p.h. and can reach 30 m.p.h. from a standing start in only 10 sec. The service braking performance matches the acceleration and the emergency brakes are even more effective. A fourth car is to join the other three in the near future.

The C.T.A. initiated the present research and development programme after extensive tests had been carried out with four cars adapted experimentally for high-speed performance in 1955. The lessons learnt from those cars have been incorporated in the new designs, and these were described recently by Mr. Stanley D. Forsythe, General Superintendent of Engineering, C.T.A., at the mid-year meeting of the American Transit Association in Cleveland.

Automatic Interlock Control

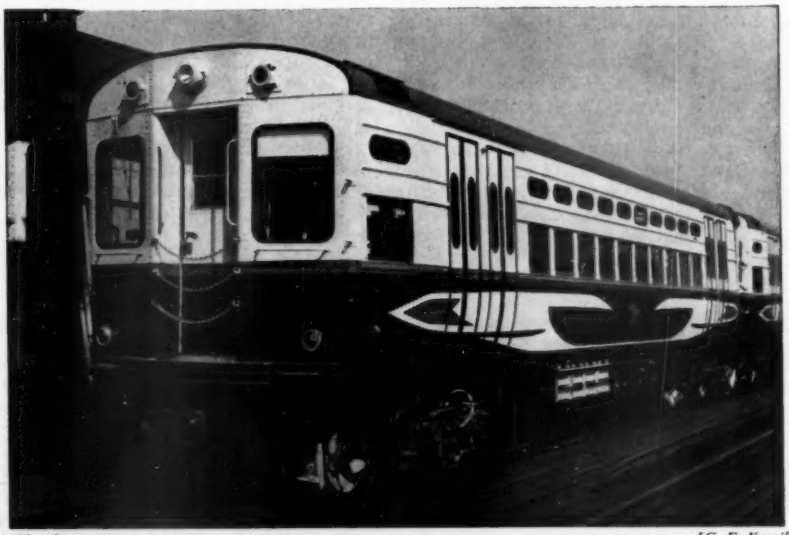
The experimental cars were of the 6,000 class and were fitted with high-performance motors and controls as well as with modified gear and pinion ratios. When running with ordinary cars, an automatic interlock control was brought into use so that they operated only in series at a top speed of some 50 m.p.h., but when running together in trains of high performance cars the control could run up into parallel with shunted fields, bringing the speed up to 75 m.p.h. The maximum accelerating rate was set at 3 m.p.h. per sec., but was retained up to 30 m.p.h. instead of 15 m.p.h. as with the standard cars.

The experimental cars proved their ability to run at high schedule speeds even in frequent-stop services, but although the electrical equipment proved reasonably satisfactory the same could not be said for the bogies or the gears. Because there is no suitable high-speed rapid-transit car bogie in production, the C.T.A. decided to test several new bogie designs under its new cars. As the electrical equipment is an improved version of that used for the 1955 test cars the main interest in the new stock lies in the bogies, in the design of which various groups and equipment builders co-operated.

All four new cars, built by the St. Louis Car Company, are double-ended units with cabs, couplers, door controls, and so on, complete so that they can be used as single cars or coupled into trains as required. This is a departure from previous practice as all other new cars have been single-ended and coupled together in two-car units with cabs and couplers at the outer ends only. The four cars will be easily recognisable by the public, as they are distinctively painted in a red, grey, maroon, and black livery. Cars Nos. 1 and 2 will have General Electric Company and Cars 3 and 4 Westinghouse Electric Corporation motors.

Modifications for High-Speed Operation

Car No. 1 has B-20 bogies designed by the C.T.A., the Transit Research Corporation, General Electric, and the St. Louis Car Company. The design is similar in most respects to the B-3 bogie which has given good results under C.T.A. cars, but is modified for high-speed high-performance operation and to test various ideas for springing, bolster control, and motor mounting. The B-20 bogie has independent side frames held together by the axle housings. The housed axles and gears were built by General Electric and include an unusual gear arrangement in which the gear is carried on a quill instead of on the axle shaft, the drive between the quill and the axle being through rubber. This enables thrust bearings to be eliminated and with them the possibility that an axle may fail because of axle flexing at the thrust bearing when a journal bearing fails.



Photo] [C. E. Keevil

Car No. 2 fitted with General Steel Castings Corporation one-piece bogie frame

The bolster is carried on four sets of small-diameter coil springs, each set consisting of two coils with a rubber cylinder between them. The bolster has boxes for conventional rubber snubber blocks and also mountings for bolster anchor rods, so that both types of bolster control can be tested. Cylindrical shock absorbers control vertical bolster motions and rotary shock absorbers damp lateral movement.

The motors are hung from the bogie side frames, being attached through rubber in one bogie and without rubber in the other to determine whether rubber is really necessary. The disc brakes are mounted on the pinion shaft of the axle unit instead of on the motor armature shaft. The drive is by Spicer universal joint drive shafts and Timken roller bearings are fitted.

Car No. 2 has bogies by the General Steel Castings Corporation. The frame is a one-piece casting in alloy steel and the bolster is carried on two sets of coil springs, each consisting of an inner and outer coil. The bogie was designed to use Houdaille friction snubbers to control vertical bolster motion and rotary shock absorbers to deal with lateral motion, but the friction snubbers may be replaced by hydraulic shock absorbers after tests have been completed. The bogies have open axles with S.K.F. axleboxes working in pedestals and gear units by the General Electric Company. The motors are mounted on the transom members, which form part of the main frame castings. The disc brakes are on the motor shafts and the drive to the gear unit is again through Spicer shafts. As the frame is supported on coil springs over each axlebox, the track brakes had to be given unsprung support by light-weight equaliser bars.

Budd Pioneer III bogies are used on car No. 3. These are fabricated bogies with independent side frames which clamp, through rubber, around Timken axleboxes on an open axle. To relieve the axles and axleboxes of the work of keeping the bogies in alignment, a bracket terminating in half a ring is attached to each side frame. The two half circles fit loosely about a centre post, the post performing most of the functions of a centre pivot but carrying no weight. The swivelling part of the bogie itself has no springs, but there are air springs between the car body and bolster, which rests on the bogie side frames through low-friction type side bearings. Lateral and vertical rotary shock absorbers work between the two halves of the body bolster.

The motors are close-coupled to the Dana Drive gearboxes on the open axles, so that drive shafts are not needed. The driving end of the motor frame is bolted to the gearbox through an intermediate housing which encloses the disc brake, and the motor shaft and the pinion shaft of the gearbox are connected by a flexible coupling. The other end of the motor is supported from the bogie frame by two anchor-type rods with rubber elements incorporated in the supports. The wheelbase of the Budd bogies is 6 ft. 10 in., 4 in. longer than the B.20 and General Steel Castings bogies, to give room for brush removal on the close-coupled motors.

Three sets of Budd bogies have been running for some time in suburban services of the Pennsylvania Railroad in the Philadelphia area.

Fabricated Bogie

The bogies of car No. 4 are another co-operative design, this time by the C.T.A., the Transit Research Corporation, the Westinghouse Electric Corporation, the St. Louis Car Company, and the Dana Corporation. The bogie is of fabricated type with open axles, the side frames being held in alignment by two connecting transoms rigidly attached to one side frame and connected through diagonally placed rubber elements to the other. The side frames are clamped through rubber to the axleboxes as in the Budd bogies. Hyatt axleboxes are used.

The Westinghouse motors are close coupled to the Dana drive gear units as in the Budd bogies, and the disc brake is between motors and gearboxes. The free ends of the motors are hung from anchor-rod type hangers, again as in the Budd bogies. The close-coupled motors do not leave room for the standard type of kingpin, so the bogie is designed to use a shallow centre plate and roller side bearings. The suspension is generally similar to that used on the present C.T.A. cars.

After exhaustive testing, the cars will be placed in special high-speed service on the Congress route, which runs largely in the open along a median strip in the Congress Expressway. The route was the first to be planned and constructed as part of a motor road and was not ready for operation over its permanent tracks until March this year (A service had been running over part-permanent, part-temporary tracks since June, 1958). Some of the stations—suburban stations at the western end—are still under construction. With their 100 h.p. motors, instead of the 55 h.p. usual for C.T.A. cars, the new cars should give good timings over this route. They will be joined in the service by the four earlier experimental cars, repainted in the same livery as the new cars. The eight vehicles will probably be made up into two four-car trains running in limited-stop service in morning and evening rush hours.

The comfort of the passenger has not been overlooked in all the technical changes. Each car has an electric heating and forced air ventilating system. There are 12 heater cases on each side of the car and in each case are two double-ended enclosed strip heaters which can be set at three different thermostatically - controlled heating ranges. The forced air system can either force air into the car or draw warm air from inside and exhaust it to the outside.

Photo] [*C. E. Keevil*

Car No. 3 fitted with Budd Pioneer III fabricated bogies

AUTOMATIC TRAIN ANNOUNCERS FOR BARKING STATION.—Train announcements on two of the busiest platforms of Barking Station, British Railways, Eastern Region, will be made automatically when a new public address system now being manufactured by the General Electric Co. Ltd. has been installed. Introduction of this system will be carried out concurrently with station reconstruction work now in hand. In addition to two automatic announcers, there will be a broadcasting system enabling an operator to make special announcements by microphone to any or all of the platforms and the booking hall at any time. Serving the down Southend platform and the down Tilbury platform, the automatic announcers will be able to operate simultaneously and each will have a tape capacity for 25 pre-recorded announcements. This work is to the specified requirements and will be carried out under the supervision of Mr. R. A. Green, Signal Engineer, British Railways, Eastern Region.

RAILWAY NEWS SECTION

PERSONAL

We regret to record the death of Mr. C. W. G. Elliff, former Road Transport Liaison Officer, Southern Region, British Railways.

Mr. W. S. M. Stapleton, Treasurer, Southern Region, British Railways, is retiring at the end of September. Mr. C. H. Clarke, Assistant Treasurer, has been appointed to succeed him.

Mr. L. T. Madnani
Railway Adviser to the High Commissioner for India, 1957-60

Mr. P. C. Kapoor
Appointed Railway Adviser to the High Commissioner for India

Mr. L. T. Madnani, Railway Adviser to the High Commissioner for India in the United Kingdom, who, as recorded in our July 15 issue, has returned to India, was born on May 15, 1909, and was educated at Delhi and Lahore. He joined the Indian Railways as a special class apprentice in 1928, and after four years' training at Jamalpur Locomotive Works, came to Britain and studied for two years with the L.M.S.R. at Crewe. On his return to India in 1935, Mr. Madnani was appointed an Assistant Works Manager at Jamalpur Locomotive Works. During the next six years he worked there in various capacities and was then transferred to the Divisions. In 1942 he was promoted to be Divisional Mechanical Engineer. He returned to Jamalpur as Works Manager in 1946, and in 1948 was selected and posted as a Senior Mechanical Engineer in the organisation formed to establish a locomotive building works in India. In 1949 he again visited Britain in company with the General Manager of the Chittaranjan Locomotive Works to check on the progress of machinery and plant ordered in this country, and to form a liaison with the British locomotive manufacturers. At the end of 1953 he visited Japan to tour the works of locomotive building firms there. In January, 1955, when the Chittaranjan Locomotive Works had achieved the original target output of 10 locomotives per month, Mr. Madnani was posted to the Railway Board, Ministry of Railways, New Delhi, as Joint Director, Mechanical Engineering. In June, 1956, he took over as Director, Mechanical Engineering, and in February, 1957, he returned to this country as Railway Adviser to the High Commissioner for India.

Mr. A. I. Jones, Transport Tribunal Secretary, British Transport Commission, is to retire.

Mr. T. R. V. Bolland, Traffic Superintendent, S.E. Division, Southern Region, has been appointed Line Traffic Manager (South Eastern Division), Cannon Street, with effect from 1st August, 1960.

Mr. J. R. Madge has been appointed Principal Private Secretary to the Minister of Transport, succeeding Mr. J. Garlick.

Following the recent retirement of Mr. W. H. Jenkins from the position of Chief Traffic Manager, New South Wales Government Railways, Australia, Mr. J. L. Russell has been appointed to fill the vacancy, and Mr. W. H. Hayman has been appointed Assistant Chief Traffic Manager.

Mr. H. H. Edwards, Superintendent in charge of the Manchester Division, North Eastern Region, has been appointed Assistant Chief of Police, North Eastern Region, York.

Mr. P. C. Kapoor, Chief Mechanical Engineer, Northern Railway of India, who as recorded in our July 15 issue, has been appointed Railway Adviser to the High Commissioner for India in the United Kingdom, joined the North Western Railway in July, 1935 as Assistant Mechanical Engineer at Ferozepore. He was a Special Class Apprentice, and obtained an Honourable Mention in the Institution of Mechanical Engineers' Examination, in London. In 1946 he became Administrative Officer (Mechanical) on the Eastern Punjab Railway, and in 1948 he was seconded to the Railway Board, where he worked as a Deputy Director until May, 1949. He then returned to the Eastern Punjab Railway as Deputy Chief Mechanical Engineer in the Headquarters Office, and was appointed Administrative Officer (Mechanical) in September, 1950. Later he served on the Railway Board as Joint Director, Mechanical Engineering, and during this period he was also a member of the Engineering Capacity Committee commissioned by the Ministry of Commerce & Industry. In 1954 he was sent to the U.S.A. to assist the General Service Administration to obtain rolling stock for the Indian Railways. On his return he was appointed Chairman of the Workshop Reviewing Committee. In 1956 he visited the

Mr. S. O. Screen

Assistant Line Traffic Officer (Operating), L. M. Region, Central Lines, 1954-60

U.S.A. again, as a member of a delegation seeking technical assistance for the Chittaranjan Locomotive Works steel foundry project. In 1957 he was appointed to serve with the Ministry of Finance in connection with the Inspection Directorate of General Supply & Disposal. Later that year he was appointed Director, Mechanical Engineering. He returned to the Northern Railway as Chief Mechanical Engineer in 1958.

Mr. S. O. Screen, Assistant Line Traffic Officer (Operating), L.M. Region, Central Lines, Manchester, who, as recorded in our August 5 issue, has retired, joined the Midland Railway in 1914. He served with the Sherwood Foresters, 1918–20. In April, 1920, he resumed railway service in the General Superintendent's Office, Derby, and in 1923 he was appointed to the personal staff of the Chief General Superintendent, Derby, L.M.S.R., and transferred to the Chief Operating Manager's Office, Euston, in 1934. He became Head of Engine Workings & Train Diagrams Section, Chief Operating Manager's Office, in 1936, and from 1938 he was given added responsibilities in connection with emergency operating arrangements on the outbreak of war. In November, 1939, he joined the R.E. and served in the Movements Directorate at the War Office. In 1940 he was promoted to be Lieutenant-Colonel in charge of the Q(M)5 Branch, War Office. He became a Colonel in 1942; and, in 1943, he was appointed Deputy-Director of Freight Movement (Home). He was demobilised in July, 1945, and in August he became Chief of Divisional Trains Office, Manchester, L.M.S.R. Mr. Screen was appointed Chief of Divisional Trains Office, Crewe, in April, 1946, and was made District Operating Manager, Crewe, in June, 1948. In November, 1948, he was redesignated District Operating Superintendent, Crewe. He was appointed District Operating Superintendent, Manchester (W), London Midland Region, in 1949, and in 1954, he was promoted to be Assistant Line Traffic Officer (Operation), the position from which he now retires.

Mr. R. W. Stuart Mitchell has relinquished his appointment as group chief engineer to Associated British Engineering Limited, and has accepted the new Chair of Gas Turbine Technology at the Technological University of Delft, Holland. He will retain his connection with Associated British Engineering Limited as technical adviser to the group for a period of two years.

Mr. Frank Cousins, General Secretary, Transport & General Workers' Union, is undergoing hospital treatment.

Mr. A. L. Williams, National Agent of the Labour Party, has curtailed his holiday to return to Transport House to deputise for Mr. Morgan Phillips, General Secretary of the Party, who is recovering from his recent sudden illness.

Mr. R. Wilson, Relief Stationmaster, Newcastle District, North Eastern Region, has been appointed Stationmaster, Woodburn, also to be in charge of Bellingham and Reedsmouth Stations.

Mr. C. F. Pagnamenta has been elected to the board of the Guest, Keen Iron & Steel Co. Ltd., a subsidiary of Guest Keen & Nettlefolds Limited. He remains Secretary of the Guest Keen Iron & Steel Co. Ltd.

Mr. Wilfrid J. Fry, a Director of Solartron Research & Development Limited, has been appointed Sales Director & Commercial Manager of the Solartron-John Brown Automation Co. Ltd.

Mr. G. M. Wells, Partner in the firm of Livesey & Henderson, whose death was recorded in our August 12 issue, was born at Winchester in 1893. He was educated Churcher's College, Petersfield, and apprenticed to the London & South Western Railway. He served for a time as District Locomotive Superintendent of the East Bengal Railway, India, and then returned to this country as Works Manager, Robert Stephenson Limited, Darlington. From 1937-45 he served with the Ministry of Supply at Woolwich Arsenal and the Royal Ordnance Factory at Risley. He joined Livesey & Henderson in 1945, and became a Partner in 1959.

Mr. Denis R. Ward, Assistant Secretary, and Mr. Arthur W. Gurney, Chief Cost Accountant, have been appointed Local Directors of Hadfields Limited.

Mr. A. W. Durrant has resigned from his appointment as a Director of the British Metal Corporation Limited, which is a subsidiary of the Amalgamated Metal Corporation Limited.

Sir Donald Perrott has been elected to the board & Deputy Chairmanship of Dewrance & Co. Ltd. Mr. M. J. Verey has resigned from the board of that company. Dewrance & Co. Ltd. is a subsidiary of Babcock & Wilcox Limited.

Mr. C. R. Wheeler is relinquishing the chairmanship of the Guest Keen Iron & Steel Co. Ltd. and his directorships and executive appointments with the G.K.N. group. He has accepted an appointment as an additional Vice-Chairman of Associated Electrical Industries Limited. Mr. Wheeler will remain a Director of Guest Keen & Nettlefolds Limited. Reference to the amalgamation of the separate steel companies in the G.K.N. group is made on page 263.

B.O.C. Fellowships

The British Oxygen Co. Ltd. has awarded the following Fellowships for post-graduate research training: Mr. P. C. Bonsall, Birmingham University, for research training at the Royal Technical College, Salford, Lancashire; Mr. J. W. May, Oxford University, for research training in the Inorganic Chemistry Laboratory, Oxford University. Renewal of Fellowship for a third year has been granted to the following: Mr. G. Saville, Oxford University, for research training in the Inorganic Chemistry Laboratory, Oxford University; Dr. P. G. Clay, for research training at King's College (University of Durham), Newcastle-on-Tyne.

Mr. A. L. Crewe

Assistant Regional Establishment & Staff Officer, Eastern Region, 1952–60

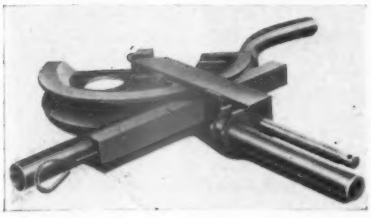
Mr. A. L. Crewe, M.B.E., Assistant Regional Establishment & Staff Officer, Eastern Region, has retired. He began his railway career in June, 1911, in the Office of the Chief Goods Manager, Great Central Railway, and was transferred shortly afterwards to the General Manager's Office. He joined the Royal Flying Corps in 1915, and four years later resumed duty on staff work at Headquarters. At the time of grouping, he was appointed to a position on the Managing & Salaried Staff Section of the Chief General Manager's Office, L.N.E.R., and became Secretary of Sectional Council No. 1 in 1928. He assumed control of the Managing & Salaried Staff Section in 1932, and at the outbreak of war was appointed Staff Assistant to the Divisional General Manager, Southern Area, L.N.E.R. For a long time during the war he acted as Railway Labour Supply Officer in liaison with the Ministry of Labour and in 1947 was awarded the M.B.E. On nationalisation, he was made General Assistant to the Chief Regional Officer, Eastern Region, and in 1952 became Assistant Regional Establishment & Staff Officer, Liverpool Street. Mr. Crewe has had a long association with the Railway Convalescent Homes, and has been Chairman of the L.N.E.R. Staff Assistance Fund and the G.N.R. Supplementary Fund since their inception. He is a a Serving Brother of the Order of St. John. Reference to presentations made to Mr. Crewe on his retirement is made in our news columns.

With reference to the biographies of Mr. S. F. Dingle and Mr. A. H. Hart in our August 19 issue: Mr. Dingle is 58 years of age; Mr. Hart was born in 1918.

Mr. B. J. Storrar has been appointed Sales Manager of Edwin Cooper & Co. Ltd.

Mr. G. K. Newman has been appointed Chief Executive Officer of the Road Haulage Association Limited.

NEW EQUIPMENT AND PROCESSES



Bender for Copper Tube

A HAND-OPERATED copper tube bender has been added to the hand bender section of the "Staffa" range of pipe and tube-bending machines.

This vice or bench-mounted tool will produce right- or left-hand "offset" bends with the minimum of straight in copper tubes to B.S.S. 659/1955, from $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. dia. It has all the features of portable compression benders, and is equipped with former dies, machined to close limits, and special machined back guides, to prevent tube deformation.

The formers are immediately interchangeable without the use of spanners or special tools, and a patent back clamp ensures automatic grip on the tube without surface marking.

The pressure roller can be infinitely adjusted and bends up to 180 deg. can be produced in one operation without heating, filling, or removing the tube.

Further details can be obtained from the manufacturer, Chamberlain Industries Limited, Staffa Works, Argall Avenue, Leyton, London, E.10.

Flexible Coupling

QUADRIFLEX four-way flexible couplings have been designed to give dependable transmission of power from one shaft to another and, at the same time, to withstand all kinds of misalignment and end float.

Torsional flexibility is up to 15 deg. at peak torque. The teeth of two rubber sleeve halves lock into the teeth of the flanges without clamps or screws and tighten under torque to provide smooth transmission of power. A retaining ring as shown in the illustrations, is fitted for high-speed use.

The coupling is easily installed and unaffected by abrasives, dirt, or moisture. There is no metal-to-metal contact and the absence of wear eliminates the need for lubrication or maintenance. Operation is stated to be noiseless.

As its name implies the Quadriflex is designed to accommodate all the four forms of flexibility: angular misalignment up to 1 deg.; parallel misalignment up to $\frac{1}{16}$ in. (depending on shaft size); free end float up to $\frac{1}{8}$ in. (depending on coupling size); and torsional load (vibrating, uneven, and shock). No destructive overhung loads are placed on driving or driven shafts so that longer bearing and shaft life is assured. It is claimed that angular or parallel misalignment does not generate unbalance or pulsations because all the flexing takes place within the rubber sleeve.

External finish is smooth and there are no protruding nuts or bolts to cause injury or catch on to clothing. The rubber sleeve acts as an electrical insulator between the driving and driven unit.

Alignment can be checked with a straight-edge placed across the outside of the flanges.

Further details may be obtained from the manufacturer, R. & J. Dick Limited, Greenhead Works, Glasgow, S.E.

Tape Unit for Computers

EPSYLON computer tape store units are suitable for use with any electronic digital computer which relies on information fed from magnetic tape. They are fully transistorised and can store up to 160,000,000 digits of information distributed over 16 tracks on a 3,600-ft. tape, 1 in. wide.

Particular attention has been paid to achieving the high speeds necessary for starting, stopping, and reversing of the tape, all of which require only $1\frac{1}{2}$ milli-sec., to permit the high "packing" density of this medium to be used to the fullest extent, i.e. with the minimum of gaps. Information is fed at a high rate into a computer in blocks prior to each phase of computation. Wear and damage of the tape is avoided by automatic means which reduce human error. The tape runs are simplified and spools are of the quick-release type.

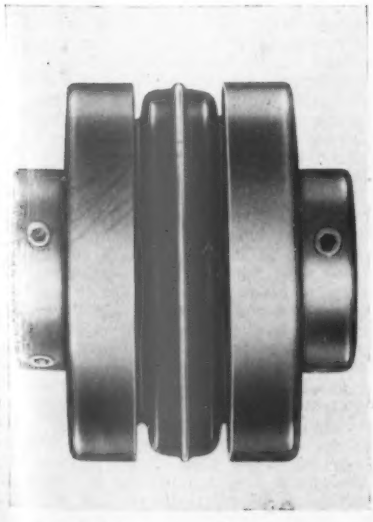
There is one main capstan and associated pinch roller for each direction of tape motion. Two heads at a gap-centre spacing of 0·9 in. deal individually with reading and writing. This space will be reduced further by the introduction of a double head.

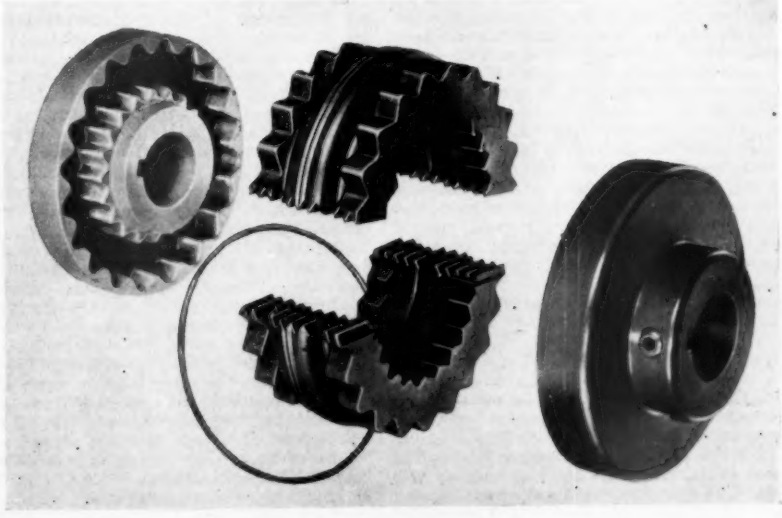
Back tension caused by inertia of supply spools is eliminated by the use of reservoirs, each holding some 15 ft. of tape; the quantity is maintained constant by photo-electric sensing and a servo system controlling the spool motors. This enables supplementary capstans driven through fluid couplings to push tape into the reservoirs from the spools.

When the fast-wind condition is selected the reservoirs are automatically emptied slowly until the tape path is straight, the gates lift to clear the pinch rollers and pressure pads, and the tape then runs, at a controlled tension, to about 350 in. per sec. This continues until a photo-electric sensing device in the main capstan assembly finds the end of tape window whereupon the tape is stopped in readiness for re-reading commands.

Modular principles of construction have been used for ease of manufacture and servicing. Space is included for digital read/write amplifiers. Cooling is by forced air.

Further details may be obtained from the manufacturer, Epsylon Industries Limited, Faggs Road, Feltham, Middx.





Ministry of Transport Accident Report

Ardsley Station, October 26, 1959: British Railways, North Eastern Region

Colonel D. McMullen, Inspecting Officer of Railways, Ministry of Transport, inquired into the collision which occurred at 10.8 p.m. at Ardsley Station, on the down main line between Doncaster and Leeds, between an express passenger train and a light engine. The Ardsley Station signalman had sent the light engine into the forward section to Ardsley North where it was to stand ahead of a shunting signal for a reverse movement to the up line. He had not, however, block signalled it forward. Later he accepted the down express, obtained "line clear" for it from Ardsley North and cleared his home and starting signals, having forgotten that the light engine was still standing on the down main line. The driver of that engine had not sent his fireman to the box to remind the signalman of the position of that engine, as torrential rain, accompanied by a gale force wind, fell for several hours.

Ardsley Station is on the main line between Wakefield and Leeds Central, at the junction with the branch line to Bradford. The main line rises almost continuously from Wakefield, and approaching Ardsley the gradient is 1 in 117. Through the station the lines are on a slight left-hand curve. The speed of trains on the main line is restricted to 60 m.p.h.; and to and from the branch it is restricted to 15 m.p.h.

Site of Collision

The lay-out is shown in the accompanying diagram. All the signals are semaphores except the down starter (25 to branch and 27 to main), which is a three-aspect colour light with a direction indicator. Signal 27 also

The express train comprised seven bogie vestibule coaches, all fitted with Buckeye type couplings. They included four open type coaches, and in these the seats and tables were wrenched from the floor and damaged. This was responsible for the majority of the casualties.

Regulations Governing Working

The block regulations of the former London & North Eastern Railway were still in force in the North Eastern Region (except on lines which were part of the former London, Midland & Scottish Railway). They contain no regulation to cover shunting movements into the forward section.

The British Railways Rule Book provides:

Rule 55 (b): When a train or vehicle has

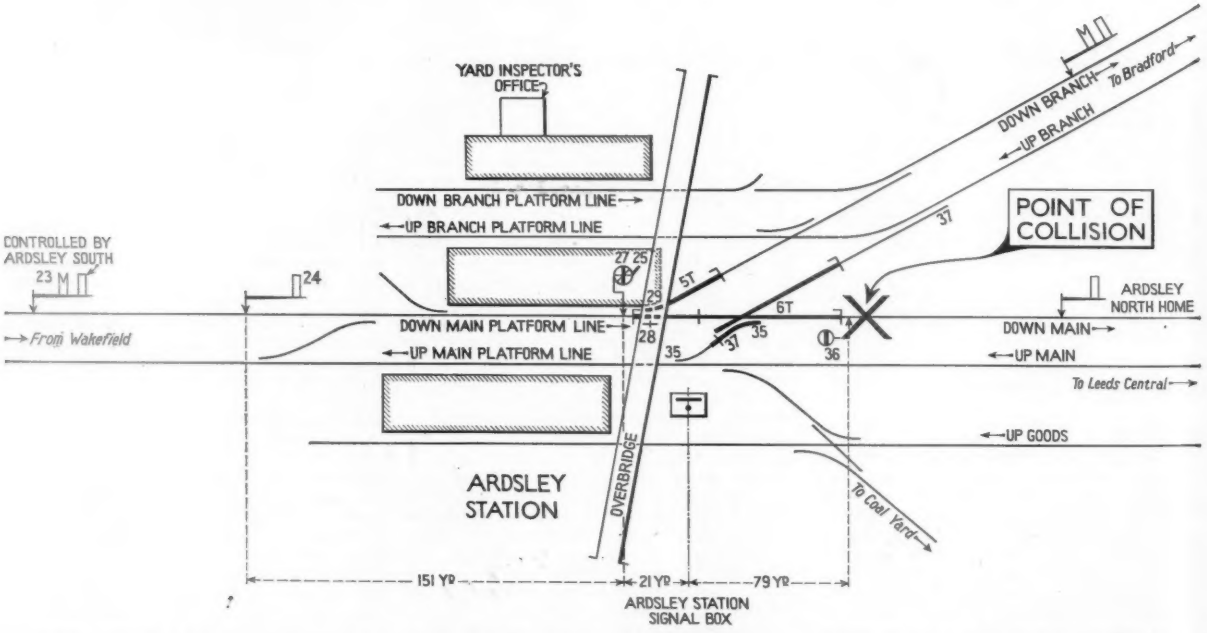


Diagram showing circumstances of accident at Ardsley Station, British Railways, North Eastern Region, October 26, 1959

required by the rules. Fortunately the Ardsley Station distant signal had not been cleared for the express which was travelling at only about 35 m.p.h. when the collision occurred. The effects of the impact was also lessened by the fact that the brakes of the light engine were not fully applied.

As a result of the collision the light engine was propelled forwards about 85 yd. and partially derailed. The engine and the leading two coaches of the express train were also derailed, but they remained upright and in line. Sixteen passengers and six railwaymen were injured, two passengers being detained in hospital. All casualties were removed from the scene of the accident by 11.5 p.m.

Both the main lines were blocked. The track was repaired by 5.40 p.m. on October 27, when normal working was resumed at restricted speed. Meanwhile some trains were passed over the up goods line, on which absolute block working was introduced.

At the time of the accident the weather was stormy and showery, but visibility was good. Later, the weather deteriorated and acts as Ardsley North distant, and its green aspect is controlled from that box. The sections are short—841 yd. from Ardsley South to Ardsley Station, and only 478 yd. from Ardsley Station to Ardsley North. Shunting signal 36 is 100 yd. beyond signal 25/27 and 79 yd. from the centre of the box. Signal 25/27 is only 151 yd. in advance of the down home signal 24, and so the overlap for acceptance from Ardsley South under Regulation 4 extends to some 270 yd. beyond signal 25/27.

There are two track circuits on the down line, but they extend only up to shunting signal 36. There are no "block controls" on the down line.

The junction facing points 29 are set normally for the main line, and points 37, on the up branch line, for the up branch platform line. The usual junction interlocking is provided, which ensures that points 29 must be reversed for the branch line before points 37 can be reversed.

Ardsley Station box is a busy box, in the "special" grade, handling some 300 trains and light engines every week-day.

passed a stop signal for the purpose of being crossed to another line, or to be let into a siding . . . the Guard, Shunter or Fireman must (except where printed instructions are given to the contrary), when the train or vehicle comes to a stand, and is detained, proceed immediately to the signalbox and remind the signalman of the position of the train or vehicle, and . . . remain in the box until the signalman can give permission for it to proceed or to be shunted clear of the running lines.

Rule 38(b): Home signals where starting signals are not provided, starting signals where advanced starting signals are not provided and advanced starting signals, control the entrance of trains into the section ahead, and must not be passed at danger except as follows:—

(ii) Where the position of siding connections or crossover roads renders it necessary for the signal controlling the entrance to the section ahead to be passed for shunting purposes and a shunt-ahead signal is not provided, a driver may, for this purpose, pass the signal at danger upon being directed

to do so by the signalman, either verbally or by a green hand signal held steadily. . . .

The driver of the express train said that he closed the regulator when he saw Ardsley Station distant signal at caution, but opened it when he saw the home and colour-light starter at clear. The crew were unaware that the train had collided with an engine until afterwards, and the driver, in fact, thought that his engine had become derailed on the junction crossing. He said that he was keeping a good look-out ahead, but he turned on the blower and glanced at the water gauge when passing through Ardsley Station. He did not see the tail lamp on the light engine, and did not think that he could have done so before passing the colour-light starting signal because of its brightness. The fireman was busy on other duties.

The driver of the light engine said that after passing the South box he saw that Ardsley Station home signal was off and the colour-light starter at yellow. He stopped his engine just beyond shunting signal 36 (as he was destined for the coal yard on the up side of the line) and said that he gave a short pop on the whistle. He went on to say that about 15-20 sec. after he had stopped an up train from Bradford passed over the junction, and he commented on the short interval to his fireman. After that train had left the station he again gave a pop on his whistle. He thought his engine had been standing about 3 min. and certainly not more than 4 min. when he saw the headlights of a down train, and he soon realised that it was the Kings Cross-Leeds express. His fireman jumped off the engine at once, and after making a very small application of the brake he did likewise just before the impact.

When questioned about his failure to comply with Rule 55(b) when the engine was standing at the shunting signal, his replies indicated that he thought the line was track circuited and so he was not required to do so. Also, that neither he nor other drivers had ever carried out the rule at that signal. He further stated that it was the usual practice for drivers of engines destined for the coal yard to stop at that signal, but that sometimes the signalman would advise the driver when the engine was passing the box to proceed to Ardsley North box where there is another entrance to the yard. The light engine fireman generally corroborated the driver's evidence.

Signalman's Evidence

The signalman on duty at Ardsley Station box said that he had arranged to cross the light engine into the coal yard over the connections opposite his box, and he cleared the home signal, 24, and the starter, 27, for it, but he did not block signal it to Ardsley North. As he expected, it stopped on the down main line just beyond shunting signal 36. Before its arrival he had accepted an up train from Bradford with points 37 set for the up branch platform line, which was in order. After the light engine had stopped, he re-set the junction for the up train to pass to the up main platform line. He also accepted the down express with points 29 set for the branch line, which was also in order. He then obtained "line clear" from Ardsley North and after the passage of the up train he re-set the junction for the main line, and cleared the home signal and the colour-light starter, but not the distant, for the express, having forgotten that the light engine was still standing on the down main line. He could not explain this forgetfulness, nor why he had not placed a collar on the lever of the starting signal. He said, however, that he was anxious not to delay the express, and he agreed that if he had crossed the light engine to the coal yard after the passage of the Bradford train, as he should have done, the express would have been checked at his signals. He said that he did not hear the light engine whistle, but added that on account of the weather the box windows were shut.

Irregular Signalling Procedure

He agreed that it was irregular to clear the starting signal for the light engine to proceed into the forward section towards Ardsley North without block signalling it. This practice had existed for many years, and that he had inherited it from his predecessors. He had never discussed the point with the stationmaster or the District Signal Inspector. He knew that the two other regular signalmen working in the box had, not long before the accident, changed their system of working and had started to place light engines making such movements on the forward block. He did not know why, and had not considered it necessary for he himself to make a change. He said that crews of engines detained at shunting signal 36 occasionally, but by no means invariably, carried out Rule 55.

The booking lad on duty in Ardsley Station box at the time confirmed that he did not hear a whistle from the light engine. Signalmen manning adjacent boxes said that during the day shifts light engines were allowed to move into the forward section from Ardsley Station box without any block signal. On the other hand, one of the two other signalmen manning Ardsley Station box said that about two or three months before the accident, he and one other permanent signalman at the box had decided to put such light engines on the block. This was not the result of an incident, but because of a discussion among themselves, having agreed that the previous procedure was improper. This was agreed by an Ardsley North signalman, who added that on some occasions light engines had arrived at his box without being block signalled.

An Ardsley yard inspector said that he left his office at the Wakefield end of the down branch platform just as the light engine passed through the station. The time was then 10.1 or 10.2 p.m. At the Leeds end of the platform he waited until the Bradford train had arrived, at about 10.4 p.m. He then went into the yard, where he saw the express come through the bridge and almost immediately after collide with the light engine. He thought its speed—less than usual—was about 35 m.p.h. He did not remember hearing the light engine whistle.

The Ardsley stationmaster and yardmaster said that he was aware of the practice of engines being sent forward under a cleared starting signal without being block signalled, and had discussed it with the signalmen. He thought it was covered by Rule 38 (*b*) (ii), but agreed that that rule was applicable only when a starting signal is maintained at danger. He also said that he had heard that the practice had been in existence for many years, and thought that it must have been authorised at some time. Although he, himself, had not been a signalman, he had not discussed this matter with the District Inspector, and agreed that he should have done so. He also knew that about three weeks before the accident two of the three signalmen in the station box had begun to block signal forward such light engine movements. He thought that it was a good idea, but did not suggest to the third signalman (on duty at the time of the accident) that he should fall into line. He agreed he should have done so.

He had carried out periodical checks of the signalmen's train register books, but had not noticed any cases when Rule 55 had been or should have been carried out. He thought that in general engines did not stand at the shunting signal long enough for the Rule to be applied.

The District Inspector in charge of the area emphasised that he was unaware of the practice at Ardsley Station box in regard to light engines. Whenever he was in the box engines were invariably either block signalled forward or hand signalled past the starter under Rule 38 (*b*). He had not heard of any change in the method of working. During his visits he had checked cursorily the train register book for the previous 24 hr. He had noticed that engine crews had generally not carried out Rule 55 when they should have done so, but he had taken no action.

Inspecting Officer's Conclusions

Colonel McMullen finds that the primary cause of this accident was that there was no clear block regulation or instruction in the Ardsley Station box to cover the frequent movement of engines destined for the coal yard for the short distance into the forward section to Ardsley North. Consequently an undesirable practice of clearing the starting signal without block signalling the engine forward had been adopted. It had clearly been followed for many years and had been condoned by the local supervisory staff.

The immediate cause of the accident was a simple human failure by the Ardsley Station signalman. He forgot that the light engine was standing on the main line and cleared the signals for the express train. He had not made use of the lever collars specially provided as a safeguard against such forgetful actions. He was an excellent witness and gave his evidence in a most straightforward manner.

A contributing cause was the failure of the driver of the light engine to carry out Rule 55(b). Rule 55(a), dealing with trains brought to a stand at stop signals, gives the driver 2 min. grace. In contrast Rule 55(b), dealing with trains about to shunt, requires the driver to send his fireman to the signalbox without delay. In this case Colonel McMullen holds that the engine must have been standing at the shunting signal from 10.3 to 10.8 p.m., a full 5 min.

Nevertheless, Colonel McMullen adds, it is quite clear that the drivers of light engines had been in the habit of not complying with this rule in these circumstances, and that the habit had been condoned locally. Therefore it would be unfair to attach much blame to this driver. On the other hand, Colonel McMullen does not accept the driver's statement that the Bradford train had passed over the junction 15-20 sec. after the light engine had stopped. Again, in view of evidence to the effect that the engine was not heard to whistle, Colonel McMullen is doubtful if the engine whistle was sounded.

The driver of the express should have seen the light engine's tail lamp before the impact, but he could not have avoided the collision.

Colonel McMullen says that the stationmaster was aware of the long established practice of signalmen clearing the Ardsley Station starting signal for engines going into the forward section without being block signalled. Instead of condoning the practice (for it was clearly not covered by any Regulation and was not permitted under Rule 38(b) as he suggested) he should have stopped it. He should have noticed when checking the train register books that Rule 55(b) was not being obeyed.

Colonel McMullen thinks that the District Inspector should, during his cursory check of the books, have discovered the practice of the signalmen in dealing with light engines and realised that it was improper. He was aware that Rule 55(b) was being generally ignored by the drivers of light engines standing at the shunting signal, but he took no action.

Colonel McMullen recalls that the block regulations in force in the area do not include any clear regulation covering a movement into the forward section such as was made in this case; at places where such movements are frequent the practice in the North Eastern

Region has been to detail the action to be taken in the signalbox instructions, but this had not been done at Ardsley Station box. This, Colonel McMullen points out, has now been rectified, and he hopes that the same action will be taken at other boxes where similar conditions obtain. He is informed that the British Railways block regulations which are to be issued shortly, will contain a regulation covering such movements, but the regulation will be applied only when it has been specially authorised in the signalbox instructions.

Installation of New Equipment

It is to prevent accidents being caused by this kind of forgetfulness by signalmen that track circuits and block controls are provided, and at busy boxes such as Ardsley Station such equipment is particularly necessary. Colonel McMullen says that as a result of discussions with the Regional officers, a comprehensive scheme for the provision of these controls has been prepared and is to be implemented in the near future; it should eliminate the possibility of any further accident of this nature. At Colonel McMullen's request the Regional officers are examining other busy boxes to see if adequate controls are provided. He recommends that similar action should be taken in other Regions.

In addition he points out that among other controls to be provided at Ardsley Station is a track circuit on the Leeds side of the shunting signal concerned in this case. This will control the starting signal and should render it unnecessary for crews of engines standing at this signal to apply Section (*b*) of Rule 55. Colonel McMullen is informed, however, that that rule will continue to be applicable at that signal and that the same conditions obtain at a great many shunting signals in the North Eastern and other Regions. He says that the failure to authorise the exemption to a rule, when it is justified, will lead to disrespect for the rule. He, therefore thinks that the whole question of the application of Rule 55 (*b*) requires to be considered fully.

Securing Seats and Tables

In conclusion he recalls that the majority of the casualties in this collision resulted from the seats and tables in the modern open centre gangway type coaches of the express train becoming dislodged. He states that the method of securing these to the floor is not satisfactory, and that, as a result of a discussion with the Chief Mechanical Engineer of the BTC, it is to be improved.

Waiting Room at Darlington Station

A new waiting room has been provided at Darlington Station in the North Eastern Region of British Railways. The room is in a prominent and central position facing the ticket barriers and bookstall.

The front wall, which faces the circulating area, consists almost entirely of plate-glass in which are set swing doors. The spacious interior occupies the site of two former rooms. Two off-the-floor open stoves are mounted at knee-level on each side of a tiled chimney piece in the centre of the room. These stores are finished in bright red enamel and are of the open-grate type.

The general colour scheme is quiet and restful. The largest wall is decorated with a pattern of fishing boats and lighthouses, and functional chairs and settees strike a contemporary and elegant note. Two kinds of African hardwood with a rich mahogany tone—makore and utile—have been used in the furnishings and framework of the doors and windows.

The materials and fabrics are hard wearing and easily cleaned. The sand-coloured wall coverings, for instance, are of a plastic-faced material which will retain its freshness for many years.

Improvements have also been carried out in the ladies' waiting-room (previously modernised in 1955) and the associated toilet accommodation has also been brought up to modern standards.

The new room was designed in the Architectural Section of the Chief Civil Engineer's Department of the North Eastern Region, York, and the work has been carried out by British Railways' District Engineer at Darlington. It is the most recent of 22 waiting-rooms which have been modernised in the North Eastern Region in recent years.

Improved Lighting at Bank Top Station, Darlington

As part of British Railways, North Eastern Region, plan to improve station amenities, work is now well advanced at Darlington Bank Top Station on a scheme for the replacement of the existing lighting system, now life expired, by the more efficient and economic cold cathode lighting, similar to that now in use at both York and Newcastle Stations.

The new lighting system will consist of fluorescent tubes which have considerably longer life than either hot cathode or metal filament lamps. Perspex diffusers will protect the tubes from dust and ensure maximum controlled illumination. There will be no risk from falling glass in the event of an accident.

Altogether, 110 suspended Overlite 2/5 in. fittings each with an output of 16,400 lumens; 34 mounted Overlite 2/4 in. fittings, each with an output of 7,150 lumens; nine Trilite 5 in. fittings, each with an output of 4,320 lumens; and six Eleco-Silver Ray Lanterns, each with an output of 10,250 lumens, will be installed. The total lighting load will be 61 kVA.

Platform Illumination

The main platforms covered by high-bay roofing will be equipped with Overlite fittings suspended from the roof at 45-ft. intervals. Because of the width of the northbound departure platform an additional row, spaced at intervals of 75 ft. will also be fitted. The uncovered platforms at the south end of the station will be equipped with Overlite fittings mounted on 15 ft. high pre-stressed concrete columns spaced 45 ft. apart. In the subway Trilite fittings will be installed. The Victoria Road entrance to the station will be lit up by Overlite fittings suspended at 32-ft. intervals. In the station approach at the north end of the station, four 25 ft. Elecoslim concrete columns spaced 110 ft. apart will each carry a 250-W Eleco-Silver Ray Lantern. The parcels office and adjoining portico will be lit by suspended Overlite fittings, spaced at intervals of 66 ft. in two rows.

Wherever possible, advantage has been taken to embody the name Darlington in the light fittings enabling passengers in approaching trains to see from the carriage windows without difficulty the illuminated station name.

The historical locomotives *Derwent* and *Locomotion No.* 1 will be floodlit by directional filament lighting. The normal type of fuse has been replaced by miniature circuit breakers which switch off faulty circuits and after repairs have been completed, can be switched on by the station staff.

Exterior and interior of new waiting room at Darlington, in the North Eastern Region of British Railways

It has been necessary to reinforce the supply mains to the station because of the electrical load of the new lighting and to cater for future extensions. This is being done by installing a high-tension cable from the existing sub-station at Darlington Diesel Depot.

The high-tension switch-gear at the station end of this cable will be housed temporarily in the subway, now out of use, which passes beneath the down lines. The permanent site for the sub-station will be inside the portico.

The fittings have been manufactured by Eleco Limited, Ionlite Limited, and Benjamin Electric Co. Ltd., and the installation work is being carried out by S. H. Heywood and Co. Ltd.

Eastern Region Timetable Changes

ON introduction of the winter timetable, on September 12, the mileage of passenger trains in the Eastern Region, British Railways, worked by electric or diesel traction will be 345,000 a week, or 61 per cent of the Regional total, and 228,000 will be steam-worked.

Modernisation work during the coming winter will result in deceleration of trains on some lines, and additional time is being allowed to ensure punctuality. Between Kings Cross and Doncaster, for example, on the Great Northern Line, principal expresses will be allowed another 9 min. On the Great Eastern Line from Liverpool Street expresses to Norwich will take 6 or 7 min. longer. On the London, Tilbury & Southend Line, off-peak services will be thinned out to expedite electrification work due for completion next year.

The " Anglo-Scottish Car Carrier " service from Kings Cross to Newcastle and Edinburgh, connecting at Newcastle with steamers to Bergen and Oslo, will continue to operate until October.

Sheffield–Manchester Interval Service

Services between Sheffield, Victoria, and Manchester London Road, will be reorganised for the first time on a regular interval basis.

An hourly service will be provided from Sheffield leaving, with certain exceptions, at 45 min. past each hr. on weekdays, and 30 min. past each hr. on Sundays. Departures, from Manchester London Road, will be at 10 min. past each hr. on weekdays and 40 min. past each hr. on Sundays.

The " Tees-Thames " express, at 7.5 a.m. from Saltburn to Kings Cross, will call at Welwyn Garden City for the benefit of those who wish to contact firms and traders in the area.

The 4.15 p.m. from Kings Cross to Cleethorpes will leave at 4.10 p.m. and call additionally at Huntingdon North at 5.24 p.m. A new through train will run between Kings Cross and Ely *via* Hitchin and Cambridge on weekdays. It will leave Kings Cross at 3.5 p.m. and returns from Ely at 5.33 p.m. on Mondays to Fridays and at 5.48 p.m. on Saturdays.

Great Eastern Line

For about four months from September 12, services between Shenfield and Chelmsford will be maintained by steam and diesel trains. Electric trains will be temporarily withdrawn to enable the line to be converted to the a.c. system.

This work, and the electrification between Chelmsford and Colchester, will enable electric trains to run through between Liverpool Street and Clacton and Walton in about 18 months' time.

Engineering work for the electrification between Chelmsford and Colchester will necessitate cancellation of some trains between Liverpool Street and Clacton and Walton during the week, from Mondays to Fridays inclusive—though they will continue to run on Saturdays.

A revised regular-interval service will be provided on the Liverpool Street to Cambridge main line from November 21 as a result of introduction of electric services to Bishops Stortford. Branch line services connecting with the Cambridge main line will be adjusted.

Continental Services

From October 2 until April 15 the " Day Continental " boat train will leave Liverpool Street at 9.15 a.m. for Harwich Parkeston Quay, and connect with the day steamer service to the Hook of Holland, sailing at 11.25 a.m. From April 16, 1961, this train will be re-timed to leave Liverpool Street at 9.39 a.m.

Repairs to Bridge by Gas-Powder Cutting

An important stage in the reconstruction of the 150-ft. long railway bridge over a canal tributary of the River Don at Tinsley, near Sheffield, has been completed by British Railways, Eastern Region.

The heavy increase in rail traffic at Tinsley East Junction made it necessary to strengthen the 300-ton bridge structure and to correct distortion in the 3-ft. wide parapets. This involved cutting the parapets lengthways and re-assembling the bridge with their width increased to 4 ft.

With oxy-acetylene powder cutting equipment, work on splitting the parapet girders was started while heavy freight and passenger traffic continued to use the bridge.

The parapet girder structure comprised heavy steel laminations ranging from 3 in. to 6 in. thick. Internal steel plates and cross members were up to $\frac{3}{4}$ in. thick. Powder cutting was considered to be the most effective method of cutting several laminations of steelwork where inter-layer rust might be expected. It permitted a high cutting speed and ensured that the minimum of material was lost at each cut.

More than 9,000 cu. ft. of oxygen, 450 cu. ft. of dissolved acetylene and 400 lb. of iron powder were supplied by British Oxygen Gases Limited for consumption on the bridge site, using Saffire oxy-acetylene blowpipes and powder dispensers manufactured by the same firm. A cutting speed of up to 6 in. a min. was reached on the thicker laminations. Technicians from British Oxygen Gases Limited were available on site to advise on the powder-cutting operation.

High-speed Coal-shipping Plants at Immingham

Two new coal-shipping plants, each of which can transfer coal from railway wagons to a ship's hold at a rate of up to 1,350 tons an hr., have been installed by British Transport Docks, 400 ft. apart, on the South Quay, at Immingham, Lincs.

They were designed and constructed by Mitchell Engineering Limited in conjunction with B.T.C. dock engineers, and are expected to be in full operation by the end of this month.

Each can handle 55 wagons an hr. The tonnage varies with the size of the wagons, which range from 10 to 24½-ton capacity.

Operation is electric. Each plant consists of a combined wagon haulage and tippling device connected by belt conveyor to a 100-ft. loading tower on the quayside.

The wagon handling unit hauls loaded wagons from the foot of the plant and places them on a wagon tippler at the top of an inclined gantry. The contents of the wagons are emptied into a hopper and fed to a conveyor belt. The coal is then transported by the belt to the loading tower and on to an adjustable loading boom for discharge into holds.

The tower structure housing the boom, which is telescopic and can be raised and lowered, is mounted on a radial rail track. The boom can be adjusted to reach every part of a ship's hold to ensure even distribution.

As a wagon is emptied it is pushed off the tippler by the following loaded wagon. The empty wagon is allowed to run down the track on the other side of the gantry and up a rising ramp, until it stops. It then runs back over switch points and gravitates to the empty wagon sidings.

Two-Man Operation

Two operators work each plant. One controls the wagon haulage and tippler plants. The other, in the tower, controls all other operations. They are in telephonic communication with each other and with the staff who control the movement of wagons from the dock reception sidings to the foot of the inclined gantry.

Once set in motion the plants work entirely automatically until stopped. All movements are overlapped to ensure a continuous flow.

Staff and Labour Matters

Threatened Strike on Southern Region

A one-day unofficial strike of Southern Region motormen and steam drivers has been called for next Monday, August 29, at the instigation of the Wimbledon Branch of the Associated Society of Locomotive Engineers & Firemen. The strike is in protest against a day's suspension awarded to a driver for passing a signal at " danger " at Waterloo Station.

It is understood that a letter has been sent from A.S.L.E.F. headquarters to the union's Southern Region branches urging them not to take strike action.

Railway Shopmen

A meeting of the Railway Shopmen's National Council was held on August 23 at which the British Transport Commission gave its reply to the claim of the Employees' Side for a further improvement in the existing rates of pay of railway workshop staff.

The Commission offered increases ranging from 5s. a week for unskilled men to 6s. a week for skilled men and an improvement in the London allowance with effect from July 4.

The Employees' Side said that it could not accept the offer as a basis for discussion unless a more favourable date of operation could be given and no agreement was reached.

In response to a request made later, Sir Brian Robertson, Chairman of the Commission, has agreed to meet the Employees' Side on August 30.

London Busmen ask for More Pay

More pay and better weekend working conditions for London Transport bus drivers and conductors were asked for on August 22 by union leaders at a meeting with London Transport Executive to consider the staff shortage, estimated at between 5,000 and 6,000. The meeting was adjourned until September 5. Meanwhile, the Executive is to consider the proposals.

Contracts and Tenders

General Motors diesel-electric locomotives for Egyptian Republic Railways

The Egyptian Republic Railways has ordered from General Motors (U.S.A.) a total of 74 diesel-electric locomotives, made up of 16 model "G.8" units of 975 b.h.p., 42 model "G.12" units of 1,425 b.h.p., and 16 model "G.16" units of 1,950 b.h.p. These are additional to the 108 General Motors type locomotives now being delivered from the Kassel works of Henschel–Werke.

British Railways, Scottish Region, has placed the following contracts:

James White (Contractors) Limited: extension of examination pits, Leith Central diesel depot

James Crawford & Co. Ltd.: modernisation of Hanover Street and Dundas Court entrances, Queen Street Station, Glasgow

James Young (Contractors) Limited: raising of superstructure, bridges Nos. 157 and 158 between Burnside and Kirkhill.

East African Railways & Harbours has placed a contract with Stirling–Astaldi (East Africa) Limited for work on a 30-mile section of the Mnyusi–Ruvu rail link at the Northern end. This is the first contract to be awarded for work on the 123-mile new line which will link the Tanganyika Central Line and the Tanga Line. The work, which is principally construction of culverts and earthworks is planned to start on September 1, and to be completed on July 31, 1961. The contract is valued at some £228,000.

The Export Services Branch, Board of Trade, has received calls for tenders as follow :—

From India :

3 complete cylinders with fittings for YG locomotives.

The issuing authority and address to which bids should be sent is the Controller of Stores, North Eastern Railway, Gorakhpur. The tender No. is 28/60. The closing date is September 19, 1960. No further information is available about this call for tender at the Board of Trade. The Board of Trade reference is ESB/21354/60.

200 plate ends for keep for couple axlebox to IRS part drawing No. 1/AB-692-692A.

The issuing authority and address to which bids should be sent is the Controller of Stores, North Eastern Railway, Gorakhpur. The tender No. is 25/60. The closing date is September 14, 1960. No further information is available at the Board of Trade. The Board of Trade reference is ESB/21351/60.

From Argentina:

9,200 buffers for coaches and wagons

The issuing authority is the Argentine State Railways. Copies of the tender documents can be obtained from the Seccion Licitaciones (Tender Section), Avenida Corrientes 389, Buenos Aires. The tender No. is 31/60. The closing date is September 13, 1960. The Board of Trade reference is ESB/21466/60. No further information is available at the Board of Trade.

1,460 covered wagons
1,210 high-sided wagons
15 refrigerated wagons
100 cattle wagons
180 platform trucks.

The issuing authority is the Argentine State Railways. Copies of the tender documents can be obtained from the Seccion Licitaciones (Tender Section), Avenida Corrientes 389, Buenos Aires. The tender No. is 33/60. The closing date is September 29, 1960. The Board of Trade reference is ESB/21467/60. No further information is available about this call for tender at the Board of Trade.

300 passenger coaches of various types and gauges.

The issuing authority is the Argentine State Railways. Full conditions to tender, which cost 3,000 pesos, may be obtained from the tender section of the Railways Administration, Av. Corrientes 389, Buenos Aires. The tender No. is 28/60. The closing date is September 30, 1960. The Board of Trade reference is ESB/21601/60. No further information is available at the Board of Trade.

From Pakistan:

1 wheel lathe and vacuum exhauster.

The issuing authority and address to which bids should be sent is the Chief Controller of Stores, North Western Railway, Empress Road, Lahore. The tender No. is 143-S/O-15-A/P6(59-60). The closing date is September 20, 1960. The Board of Trade reference is ESB/21903/60. No further information is available at the Board of Trade.

From South Africa

1 Electric-motor-driven, heavy-duty universal milling machine suitable for general work in a toolroom as called for in the mechanical and electrical specifications

1 set of electric lighting equipment as called for in the electrical specification

1 set of velograph prints as called for in the mechanical specification.

The issuing authority is the Stores Department, South African Railways. Bids in sealed envelopes, endorsed "Tender No. G.8371: One Universal Milling Machine: Uitenhage," should be addressed to the Chairman of the Tender Board, P.O. Box 7784, Johannesburg. The closing date is September 16, 1960. Local representation is essential. The Board of Trade reference is ESB/21482/60.

From Formosa:

34 sets of electric token instrument systems for train operation on single-track railway.

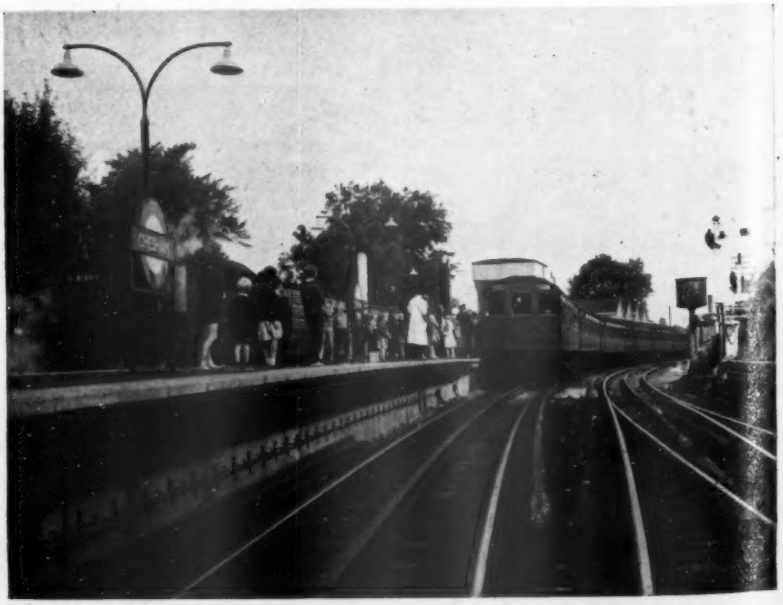
The issuing authority and address to which bids should be sent is the Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan. The tender No. is CP4B-470. The closing date is September 30, 1960. The Board of Trade reference is ESB/21698/60/ICA.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

ROUMANIAN STEAM POWER.—Though building of diesel railcars, diesel locomotives and electric locomotives is being put on to a new and enlarged basis in Roumania, steam locomotive construction has not yet ceased; and during the course of this year the 23rd Auguet Works, previously the Malaxa factory, has turned out a number of 2–10–0 tender locomotives and 0–6–0T locomotives.

Metropolitan Line Electrification, L.T.E.

(*See last week's issue*)



First electric train on the newly electrified section of the London Transport Metropolitan Line at Chesham, with present steam shuttle train, left

Notes and News

Diesel Hydraulic Locomotives.—A rough estimate made recently showed that about 600 diesel-hydraulic locomotives of 650 to 4,000 b.h.p. per locomotive-unit have been under construction (some are now delivered) this year in Europe for important European and overseas railways. This total includes 95 locomotives of more than 2,000 b.h.p.

Machine Tool Orders Increase.—Incoming orders to the machine tool industry for May, for which the figures have recently been published by the Machine Tool Trades' Association, show an increase of 66 per cent over May, 1959. Deliveries were up 7 per cent. The value of outstanding orders at the end of the month was £86,600,000, of which £20,100,000 was for export. The corresponding totals for May, 1959, were £41,000,000 and £15,300,000.

Staff Recruitment Conference.—A three-day conference, organised by the Federation of British Industries, on recruitment and training policy in small firms will be opened by Sir Norman Kipping at Buxton on September 26. The conference is intended for top executives of firms employing less than 1,000 people. Its purpose is to examine the recruitment and training problems faced by firms of this size and to find possible solutions.

Man Found on Roof of Train.—A man was seen spreadeagled on the roof of the first coach of a Euston to Glasgow express last night by the train's stoker as it neared Boxmoor station. As the train was approaching a bridge the stoker sprayed the man with a hose to prevent him from standing up. The driver stopped the train. The man slid off the train and was put in the guard's van. Police were called, but before they arrived the man escaped. The train was delayed about 20 min.

Railway Queen for 1960-61.—Britain's Railway Queen for 1960-61 is Miss Sheila Riordan, 15½-year-old daughter of Mr. W. A. M. Riordan, Shed Chargeman at Old Oak Common, Motive Power Depot, Western Region. Miss Riordan will be crowned at Belle Vue Gardens, Manchester, on September 10, 1960, under the Joint Presidency of Sir Reginald Wilson, Chairman of the London Midland Area Board, British Transport Commission, and Mr. W. I. P. Webber, General Secretary, Transport Salaried Staffs' Association.

Derailment Emergency Operation.—A derailment at Bethnal Green occurred shortly after midnight on August 16, when a diesel locomotive was involved in a collision with a steam train. One suburban line into Liverpool Street Station was completely blocked, but an emergency operation prevented serious delays to peak-hour trains the next morning. A special timetable was devised, and some trains had to be cancelled, but a bus service was provided to serve Cambridge Heath and London Fields stations which were isolated by the incident. Throughout the emergency, the public affected was kept fully informed.

Hackbridge & Hewittic Electric Co. Ltd. and Switchgear & Cowans Limited Merger.—Full details of the merger between the Hackbridge & Hewittic Electric Co. Ltd. and Switchgear & Cowans Limited have been posted to shareholders. The offer made recently by a new holding company, Combined Electrical Manufacturers, for the two companies' sharesis conditional upon 90 per cent acceptance of each class of share being received by September 9 or not later than October 7. The combined profits, before taxation, of the companies forming the new group for their respective accounting periods ending on March 31, 1961, will be at an annual level of some £700,000, and a distribution of 12½ per cent has been forecast.

Gas-Generator Locomotives.—The two 2,000 h.p. C–C gas-generator locomotives, each with two free-piston groups as generators, are now running experimentally on the French National Railways. They have been built by a consortium of three French builders.

Guest Keen & Nettlefolds Limited Changes.—For administrative reasons it has been decided to amalgamate the separate companies in the Guest Keen & Nettlefolds group. To effect the amalgamation the Guest Keen & Nettlefolds Co. Ltd. will change its name to the G.K.N. Steel Company as from January 2, 1961.

The Railway Enthusiasts' Club: Tour of Site of the New Kingmoor Marshalling Yard at Carlisle.—In connection with a special tour by diesel train of the pre-grouping goods yards, depots and lines at Carlisle during the afternoon of Saturday, September 10, a coach tour is being arranged round the site of the new Kingmoor Marshalling Yard, London Midland Region, British Railways. The tour will start from Carlisle Citadel Station at 11 a.m. and after a short explanatory talk at the Resident Engineer's office visits will be made to the three sites where work is in progress. The return to Citadel Station will be at 1 p.m. The fare for the tour will be 3s., and applications for this tour and for the 2½ hr. diesel train tour in the afternoon starting at 2.20 p.m. at a cost of 7s. 6d. should be addressed to Rail Tour Bookings, Railway Enthusiasts' Club, Farnborough, Hants, enclosing remittance and stamped addressed envelope.

Presentation to Mr. A. L. Crewe.—Following a meeting of Sectional Council No. 1 at Liverpool Street on Tuesday, August 9, Mr. Crewe, Assistant Regional Establishment & Staff Officer, Eastern Region, who retired last week, was presented with a portable transistorised radio by the Management Side and with a lighter by the Staff Side. At an informal ceremony at Liverpool Street on Tuesday, August 16, Mr. H. C. Johnson, O.B.E., General Manager, Eastern Region, presented Mr. Crewe with a walnut writing bureau on behalf of Officers and Staff. Reference is made to Mr. Crewe's retirement in our personal columns.

Grant for Study of Trade Union Development.—The research organisation, Political & Economic Planning, has received a grant of £19,900 from the Leverhulme Trust Fund for a three-year study of trade unions in a changing society. The project will concentrate on the effect of current economic technological, and social changes on union functions and organisation.

Mailbag Robbery in Southern Region.—Three hooded men overpowered the guard of the 2.25 p.m. train from Brighton to London on August 18, and escaped with about 25 registered letters. Their haul included about £10,000 in used notes. After rifling the mailbags they hammered 6-in. nails into the doors and window frames of the van. At Victoria the three men concerned in the robbery walked leisurely off the platform and vanished among a crowd of holiday-makers, leaving the guard, 54-year-old Mr. Reginald Scammell bound and gagged in his van.

East Indian Railway Officers' Dinner.—The fifty seventh annual dinner of the East Indian Railway Officers' Association will be held in the Connaught Rooms, London, W.C.2, on September 28, at 6.30 for 7 p.m. Mr. J. D. Michael will preside. The principal guest will be General Sir Rob Lockhart, late Indian Army. Tickets, price 24s., may be obtained on application to the Hon. Secretary, Mr. R. C. Harvey, Aros Shona, Copthorne, Sussex, tel. Copthorne 0115 (residence) or Victoria 8494 (office). The dress will be dinner jacket or lounge suit. The 1961 dinner will be held on September 27.

Rail Facilities for Edinburgh Festival.—During the Edinburgh International Festival of Music & Drama, British Railways, Scottish Region, is running cheap day and evening excursions to Edinburgh from many towns. Special late return trains are being run from Edinburgh to Glasgow and Dundee. In addition to the regular service of intercity diesel trains between Glasgow and Edinburgh a special late train leaves Edin-

Mr. H. C. Johnson, General Manager, Eastern Region, and Mr. A. L. Crewe, Assistant Regional Establishment and Staff Officer, Eastern Region (*see paragraph above*)

burgh Waverley at 11.25 p.m. each weekday till September 10 for Linlithgow, Polmont, Falkirk High, Lenzie, Bishopbriggs, and Glasgow Queen Street. On Wednesdays and Saturdays an additional late train leaves Edinburgh Waverley at 11.30 p.m. for Inverkeithing, Burntisland, Kirkcaldy, Markinch, Cupar, Leuchars Junction, Dundee, and Broughty Ferry; a connecting train from Inverkeithing serves Dunfermline Lower.

Luncheon to L.M. Region Mayors.—At the annual luncheon given by Mr. David Blee, General Manager, London Midland Region, British Railways, on August 19, to employees of the Region elected as civic heads of communities, Mr. Blee stated that he had entertained more mayors than had any of his predecessors. The holders of civic office were the Lord Mayors of Nottingham and Stoke-on-Trent, and the Mayors of Burnley, Burton-on-Trent, Carlisle, Chester, Crewe, Dukinfield, Kettering, Wigan, and Workington.

Diesel Train Excursion for Pitlochry Festival Theatre.—Edinburgh and Perth theatregoers will have an opportunity to visit the 8 p.m. performance of "Between the Tides," a romance of the French Revolution, at the Pitlochry Festival Theatre on September 1. A special diesel train will leave Edinburgh Waverley at 3.55 p.m. and Perth at 5.18 p.m., arriving at Pitlochry at 6.28 p.m. The return train leaves Pitlochry at 11.10 p.m. arriving at Perth at 11.59 p.m., and Edinburgh at 1.23 a.m. on the morning of September 2. Light refreshments will be on sale on the station platform at Perth.

Emu Bay Railway.—For the year 1959 the Emu Bay Railway Co. (Pty.) Ltd. showed a consolidated profit of £18,697, about £4,000 higher than in the previous year. This was after taxation of £34,885 and an allocation of £33,000 for the replacement and upkeep of locomotives. Interest paid on debenture stock was £23,388, but no dividend was declared. Gross revenue decreased by almost £18,000 due to smaller mineral traffic, but this was more than offset by some increase in passenger and miscellaneous freight traffics, and by economies in operation.

Thai Railway Officials Visit New Zealand.—The State Railways of Thailand has sent two of its officials to New Zealand for six months, under the Colombo Plan, to study the applications of T.W.I. (training within industry) in the Railways Department, and the Labour Department. They are Mr. Charoen Mahawat, chief of the education training division, Bangkok, and Dr. Chaovana Na Sylvanta, engineer-in-charge of production in the main railways workshop, Bangkok. When their term of study in New Zealand ends, Mr. Charoen and Dr. Chaovana will study for six months with the Japanese National Railways, which employs some 500,000 people. The New Zealand Railways has about 25,000 employees, some 3,000 more than Thailand.

Retirement of Driver with 47 Years' Service.—Driver A. Bassett, of Camden Motive Power Depot, London Midland Region, British Railways, retired on August 22 after 47 years' railway service. As a young fireman in April, 1928, he was on the footplate on the non-stop run of the "Royal Scot" from Euston to Edinburgh. He had driven the Royal train on several occasions. His father and father-in-law were both railwaymen; his son is a driver at Camden Depot (at one time he fired for his father); a brother-in-law and two nephews are also employed at Camden; and another nephew is a driver at Willesden. In his early days as a fireman Driver Bassett posed for Sir William Orpen for a painting, "The Night Mail," one of a series of railway pictorial posters commissioned from Royal Academicians by the then London Midland & Scottish Railway. Recently he had been driving diesel main-line locomotives. At the end of his last run, with the 10 a.m. train from Blackpool on August 22, the train was met at Euston by Mr. L. D. Taylor, Acting Motive Power Officer, London Midland Region.

Date of Next Mechanical Handling Exhibition.—The next Mechanical Handling Exhibition is to be held at Earls Court, London, from May 8 to 18, 1962. It will be the eighth in the series of this biennial exhibition which started in 1948. Over 300 firms displayed their products at the 1960 exhibition, occupying 500,000 sq. ft. of space within the hall and extending into the forecourt to provide a spacious outdoor demonstration area. Record numbers of visitors came to the 1960 show, overseas visitors were 45 per cent greater in number than on any previous occasion, and came from 77 different countries.

Wellman Smith Owen Engineering Corporation Limited.—Sir Peter Roberts, Chairman, Wellman Smith Owen Engineering Corporation Limited has stated that contracts now in hand exceed £9,000,000, and are now approaching peak figures. He adds that there is still considerable work in prospect for the iron and steel industry, both at home and abroad, which should ensure a continued increase in the activities of all those connected with the company.

Forthcoming Meetings

September 2 (*Fri.*).—The Railway Club, at the Royal Scottish Corporation, Fetter Lane, E.C.4, at 7 p.m. Members' meeting and paper by Mr. H. A. Vallance on "North of Inverness."

September 3 (*Sat.*).—British Railways, Southern Region, Lecture & Debating Society. Visit to Redbridge sleeper depot.

September 3 (*Sat.*)—Railway Correspondence & Travel Society, South of England Branch, at the Junction Hotel, Eastleigh, at 6.30 p.m. Members' colour slide display.

September 4 (*Sun.*).—The Railway Correspondence & Travel Society. Cumbrian rail tour.

September 10 (*Sat.*).—Permanent Way Institution, London Section. Visit to Temple Mills Marshalling Yard & Hump Control. Joint visit with the Exeter & West of England Section.

September 10 (*Sat.*).—Railway Correspondence & Travel Society, Kegworth–Kingston–Gotham–Nottingham, and Gypsum Mines tour.

September 11 (*Sun.*).—Railway Correspondence & Travel Society, "The East Midlander" No. 4—Nottingham to Eastleigh and Swindon tour.

September 13 (*Tue*).—Railway Correspondence & Travel Society, East Midland Branch, at the Thurland Hall, Nottingham, at 7.30 p.m. B.T.C. film show.

September 16 (*Fri.*) to September 19 (*Mon.*).—Institute of Transport, week-end course at Oxford.

Railway Stock Market

The more active conditions in stock markets have not been reflected among foreign railway stocks, which, however, were not without small movements.

Antofagasta (Chili) & Bolivia Railway ordinary stock, for instance, strengthened from 13½ to 14 and the preference stock was 32½ compared with 32 a week ago.

Costa Rica ordinary stock was 43½ and Chilean Northern debentures 57 and Mexican Central bearer debentures changed hands around 58. Sao Paulo 3s. units were 1s. 1½d. and United of Havana second income stock 6½.

Paraguay Central prior debentures were 17½, and, elsewhere, International of Central America common shares kept at $21½ with the preferred at $99½.

Canadian Pacifics moved narrowly, buyers being cautious because of uncertainty about the trend of Wall Street, but at $44 the price compared with $44½ a week ago. At this level there is a yield of 6¼ per cent, which is attractive when compared with the return on many other dollar stocks. Moreover there seem to be reasonable prospects of the dividend being maintained. Canadian Pacific 4 per cent preference stock at 58¼ yields as much as 6¾ per cent, due partly to the fact that the dividend on this stock is non-cumulative; but this is of academic importance, unless there were a very serious slump. A yield of over 6½ per cent can be obtained on the 4 per cent debentures at the current price of 61, and all things considered, it can be argued that the debentures are undervalued in relation to the preference stock, bearing in mind that the debentures, carry the higher investment status. White Pass & Yukon shares were $12¼ compared with $12⅜ a week ago.

In other directions, Nyasaland Railways shares were 9s. 6d. and the 3½ per cent debentures 46½.

West of India Portuguese Railway capital stock was 111 and the 5 per cent debentures 92½.

Among shares of locomotive building and engineering companies Charles Roberts 5s. shares were 12s. 9d. at which there is an attractive yield of over 5½ per cent. Wagon Repairs 5s. shares were 15s., and Gloucester Wagon 12s. 6d., while Birmingham Wagon were 36s. 9d.

Westinghouse Brake shares have changed hands around 47s. North British Locomotive were 8s. 4½d.

Tube Investments were 86s., which reflects higher dividend hopes. Vickers have been easier at 31s. 9d.; yield in this case is nearly 6¼ per cent, which is attractive, bearing in mind the general assumption that there are reasonable prospects of the 10 per cent dividend being maintained.

John Brown at 46s. xd have continued to hold most of the rise which resulted after the raising of the dividend to 11 per cent; the good results were regarded as a tribute to the benefits of diversification of the group activities. Stone-Platt shares have eased to 56s., and elsewhere. Dowty Group 10s. shares were 37s. 9d. and Pressed Steel 5s. shares 30s. 7½d. Ransomes & Marles 5s. shares held firm at 28s. with Pollard Bearing 4s. shares up to 45s., which reflects higher dividend expectations. Ruston & Hornsby were 28s., and T. W. Ward at 83s. 6d. have held most of their recent good advance, the demand for scrap metal having induced hopes that the group profits are continuing to run at a good level. Associated Electrical were 49s. 6d.

General Electric Co. Ltd. were 38s. 3d., and English Electric Co. Ltd. 39s., while Crompton Parkinson 5s. shares changed hands around 14s.